European and N. American Bryineæ (Mosses)

described

by

N. C. Kindberg.

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GENERA

OF

EUROPEAN AND NORTHAMERICAN

BRYINEÆ

(MOSSES)

SYNOPTICALLY DISPOSED

BY

ils conrad
N. C. KINDBERG.

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PREFACE.

The present treatise is an introduction to a synoptical Moss-Flora of Europe and N. America, ready as manuscript.

It is an essay to define all here belonging genera of Bryineæ and to dispose themselves in natural families with attention also to exotic genera and species. To clear their natural affinity I have often found that the common habit (»habitus») of the plants indicates the place in the system; it is also a »criterium« not to depreciate.

To state »a priori» the vegetable organs, of which the characters are to be chosen, does not agree with nature. There are to be found in a certain genus constant characters, which in another are very variable. »Character non dabit speciem, sed species characterem».

Recent bryologists have attached too great an importance to the organisation of the peristome. The exostome (the outer or the simple peristome) is in many genera, also in individuals, variable. The endostome of the capsule gives indeed good constant characters also in exotic, by the author examined genera and species.

Sterile specimens, so often occurring, ought not to be neglected. A trained bryologist, well-intimate with the organisation of the moss-leaves, can sometimes find new species, as well characterized, as if the specimens were fertile.

The author was beginning his bryological studies in Sweden already 1851; bryology was his speciality 1879.

I have made longer travels for this purpose also in Norway (9 summers in the alpine district), in the Pyrenees 1855, in northern Italy 1888, in the Switzerland 1888, 1889, 1892 and 1895, also several times in Germany.

My collections have been augmented by contributions from many bryologists. Many typical specimens, collected by Austin, Berggren, Bottini, Breidler, Brotherus, Cardot, Drummond, Hartman, Howe, James, Lesquereux, Levier, Lindberg, Lorentz, Milde, Philibert, Renauld, Roell, Schimper, Sullivant, Venturi, Zetterstedt and others, have been very useful.

I have also received larger collections by D:r C. Mueller (mostly exotic species), Mr J. Husnot (Musci Galliæ), the Rev:d A. C. Waghorne (about 1,000 specimens from Labrador and N. Foundland), D:r V. F. Brotherus (mostly from Finland), D:r E. Levier (from Spain and Portugal), Mr J. M. Macoun (from Alaska), D:r T. Heldreich (from Greece), Prof. J. Arcangeli (from Italy), Messrs G. A. Holt and T. Rogers (from Britain), D:r R. Gyllencreutz (from Spetsbergen).

I wish therefore to thank sincerely my friends and correspondents for valuable assistance, especially D:r Mueller, which had the benevolence to examine the greater part of my new American species (more than 200), and Prof. Macoun, having sent about 7,000 specimens, collected in N. America in long travels during many years.

Linkoeping, Sweden 12 octob. 1896.

N. Conr. Kindberg.

Ser. 1. Pleurocarpous.

Capsule lateral upon the stem or the branches, regularly dehiscing by a deciduous lid.

Stem usually very much ramose and depressed to the substrate, sometimes ascending, less often erect, rarely quite straight.

In *Hedwigia* the capsule is generally terminal.

Tribe 1. **Tricholepideæ.**

Segments of the endostome (inner peristome) ciliiform without keel or longitudinal line, free (neither connate nor united).

Capsule symmetric and erect; pedicel smooth. Leaves not distichous. Stem (except *Lindbergia*) without paraphyllia.

Sometimes the endostome or the whole peristome is wanting.

A. Leaves limbate by short cells; special alar cells generally not defined; inner cells seriate. Capsule often immersed.

Fam. 1. **Cryphæaceæ.**

Leaves smooth or papillose; borders recurved. Peristome sometimes simple or wanting. Calyptra cucullate or mitriform. Branches julaceous or subjulaceous.

B. Leaves not limbate; alar cells subquadrate; inner cells not seriate. Capsule not immersed.

Fam. 2. **Anomodontaceæ.**

Leaves generally papillose; borders sometimes recurved; upper and middle cells oval-rhombic or rotundate; costa simple. Peristome double or (in *Lindbergia*) simple. Calyptra cucullate.

Fam. 3. **Fabroniaceæ.**

Leaves smooth; borders not (or faintly near the base) recurved; upper cells suboblong or narrower. Peristome mostly simple. Calyptra cucullate. Plants mostly small, not tree-like.

Fam. 4. **Endotrichaceæ.**

Leaves smooth; borders not or indistinctly recurved; upper cells lanceolate-linear. Peristome double. Calyptra mitriform. Plants robust; stem tree-like.

Tribe 2. **Dicholepideæ.**

Endostomial segments carinate or marked with a longitudinal line, not united.

A. *Stenolepideæ.* Endostomial segments narrow (distinctly narrower than the exostomial teeth).

Capsule symmetric, not curved. Calyptra sometimes mitriform. Leaves not falcate.

a. *Distichophyllæ.* Leaves distichous.

Capsule sometimes immersed. Leaves smooth (not papillose).

Fam. 5. **Neckeraceæ.**

Upper leaf-cells generally short and wide. Pedicel of the capsule smooth. Calyptra cucullate or (in one species) mitriform. Stem sometimes with paraphyllia.

b. *Polystichophyllæ.* Leaves plurifarious.

Capsule exserted; pedicel smooth or (in *Daltonia* and *Helicodontium*) rough. Leaves often papillose.

Fam. 6. **Leptodontaceæ.**

Stem tree-like; branches often circinnate; paraphyllia often present. Leaves smooth; cells more or less dilated. Calyptra cucullate.

Fam. 7. **Meteoriaceæ.**

Stem pendent, without paraphyllia. Leaves papillose; cells very small, dilated or narrow. Calyptra mitriform or cucullate. Dioecious, very rarely fruiting.

Fam. 8. **Hookeriaceæ.**

Stem neither tree-like nor pendent; paraphyllia none. Leaves smooth or (in *Callicostella*) papillose; cells mostly dilated. Calyptra mitriform. Monoecious or polygamous.

Fam. 9. **Leskeaceæ.**

Stem decumbent, often with paraphyllia. Leaves mostly papillose; cells usually dilated. Calyptra cucullate.

Fam. 10. **Entodontaceæ.**

Stem generally decumbent, rarely ascending but not tree-like; paraphyllia none. Leaves smooth; cells mostly narrow. Calyptra cucullate.

B. *Platylepideæ.* Endostomial segments broad.

Capsule often asymmetric or curved. Calyptra cucullate. Leaves sometimes falcate.

a. Primary stem rhizomatic, mostly subterranean; secondary stems generally tree-like and suberect or ascending.

Leaves neither papillose nor falcate.

Fam. 11. **Climaciaceæ.**

Capsule symmetric or asymmetric; pedicel mostly smooth. Stem often with paraphyllia. Leaf-cells mostly narrow. Branch-leaves often strongly serrate.

b. Stem not tree-like, generally decumbent.

Fam. 12. **Thuidiaceæ.**

Capsule generally asymmetric or curved; pedicel generally smooth. Stem often with paraphyllia. Leaves usually papillose, not distichous, rarely falcate; cells mostly dilated.

Fam. 13. **Hypnaceæ.**

Capsule sometimes symmetric, more often asymmetric or curved; pedicel often rough. Stem mostly without paraphyllia. Leaves not papillose, sometimes distichous, often falcate; cells mostly narrow.

Tribe 3. **Symphyolepideæ.**

Endostome cancellate by in upper part united segments.

Fam. 14. **Fontinalaceæ.**

Capsule symmetric, often immersed. Calyptra conic or cucullate. Leaves smooth, often tristichous, sometimes falcate; cells narrow. Plants growing in water.

Ser. 2. Acrocarpous.

Capsule (generally) terminal upon the stem or the branches. Stem usually straight and erect, mostly simple or sparingly branching.

The capsule is lateral in *Anoectangium, Mielichhoferia, Schlotheimia, Macromitrium, Rhizogonium* and *Barbula squarrosa.* The stem is decumbent and much ramose (as in the pleurocarpous) in several *Grimmiaceæ, Orthotrichaceæ* and *Fissidentaceæ,* also in *Cinclidotus;* in *Leucolepis* tree-like.

Tribe 1. **Stegocarpous.**

Capsule with a distinct, generally deciduous lid.

Subtribe 1. **Filicoideæ astomæ.**

Stem frondiform, more or less divided in nerveless lobes. Peristome none.

Fam. 15. **Schistostegaceæ.**

Capsule very small. Calyptra conic. Prothallium persistent.

Subtribe 2. **Ptychophyllæ astomæ.**

Stem with subcomplicate leaves. Peristome none.

Fam. 16. **Eustichiaceæ.**

Leaves distichous, narrowly alate at the costa; inner cells irregularly polygonal, the marginal ones narrow.

Subtribe 3. **Haplostomæ.**

Stem with not complicate leaves. Peristome simple, sometimes wanting.

Section 1. *Anarthrodontæ.* Peristomial teeth solid, not articulate.

Fam. 17. **Polytrichaceæ.**

Peristomial teeth 32 or 64, small and linguiform. Leaves with narrow lamellæ near the costa; upper cells roundish.

Fam. 18. **Georgiaceæ.**

Peristomial teeth 4, large and nearly subulate. Leaves not lamellate.

Section 2. *Arthrodontæ.* Peristomial teeth transversely articulate.

A. Leaves distichous, with two broad and embracing stipular appendages (wings) at the base.

Fam. 19. **Fissidentaceæ.**

Peristomial teeth 16, usually cleft. Leaf-cells round-hexagonal or the marginal ones narrow. Plants growing on earth, seldom in springs and rivers.

B. Leaves plurifarious or (in *Distichium*) distichous, without stipular appendages.

Leaves sometimes papillose or mamillose, not rarely smooth. Plants seldom growing on trees.

a. Leaves generally not papillose (exc. some species of *Grimmia* and *Racomitrium*). Peristomial teeth not contorted.

a a. Peristomial teeth with a longitudinal line.

Fam. 20. **Splachnaceæ.**

Calyptra conic or subcucullate, very small. Peristomial teeth generally entire, seldom finally split. Leaves smooth, flaccid and faintly hygroscopic.

Capsule straight with a swollen neck or an umbraculiform appendage (apophysis) Leaves broad; cells usually pellucid and large, the alar ones not defined. Plants often robust, usually growing on animal dung or rotten animals, rarely on rocks or trees.

Fam. 21. **Dicranaceæ.**

Calyptra cucullate, large or long. Peristomial teeth generally cleft. Leaves not flaccid, sometimes mamillose.

Capsule often curved, generally narrow. Leaves mostly narrow and subulate-acuminate, often setiform; cells more or less pellucid, the alar ones often dilated and subquadrate. Tufts usually compact and very radiculose. Plants often robust, growing in swamps and woods, less often on rocks or trees.

b b. Peristomial teeth without longitudinal line.

Fam. 22. **Seligeriaceæ.**

Calyptra cucullate. Peristomial teeth not cleft. Leaves smooth, not opake.

Capsule straight, short and thick. Leaves generally setiform and subulate-acuminate without hairpoint; cells more or less pellucid, the alar ones sometimes (in *Blindia*) dilated and subquadrate, often not defined. Plants mostly small and not densely (exc. *Blindia*) tufted, growing on rocks.

Fam. 23. **Grimmiaceæ.**

Calyptra mostly mitriform, sometimes cucullate. Peristomial teeth often entire (or rimose), sometimes cleft. Leaves opake, sometimes papillose.

Capsule straight, sometimes narrow, without distinct neck. Leaves mostly narrow and not subulate-acuminate, often with hairpoint; cells small, often with sinuous walls, the upper opake but generally not well-defined from the lower ones; alar (subquadrate) cells not rarely distinct.

Tufts often dense and pulvinate. Plants not seldom small, generally growing on rocks.

b. Leaves generally papillose and opake above. Peristomial teeth often contorted.

Fam. 24. **Weisiaceæ.**

Calyptra cucullate, deciduous. Peristomial teeth mostly without a longitudinal line, sometimes wanting

Capsule generally straight, often narrow, without (exc. *Dermatodon*) prominent neck; teeth either partite to the basal tube or deeply cleft, less often entire. Leaves mostly broad, often crisped when dry; upper cells very small, well-defined from the lower ones; alar cells not distinct or forming a margin near the base; cellwalls (exc. *Geheebia*) not sinuous. Tufts often loose. Plants mostly growing on earth and stones, often sterile.

Fam. 25. **Calymperaceæ**

Calyptra persistent, dehiscing with longitudinal slits above, constricted below the unripe capsule. Peristome none.

Capsule straight and oval without neck. Leaves narrow and convolute, crisped or cirrate in dry state; upper cells very small. Tufts often loose. Plants growing on trees, rarely fruiting.

Subtribe 4. **Diplostomæ.**

Peristome generally double.

Section 1. *Stenolepideæ.* Endostomial segments narrow, rarely confluent above. Peristomial teeth articulate. Leaves not complicate.

A. Leaves generally papillose and opake above; upper cells mostly small and well-defined from the lower ones Tufts dense. Calyptra rarely cucullate.

Fam. 26. **Encalyptaceæ.**

Calyptra long-acuminate, cylindric. Basal leaf-cells finally rufous.

Capsule cylindric, often not necked. Calyptra not hairy but often rough. Leaves entire, sometimes with hairpoint. Plants growing on earth and stones. Habit of *Barbula* (Syntrichia).

Fam. 27. **Orthotrichaceæ.**

Calyptra short-apiculate, usually mitriform (conic or campanulate), rarely cucullate. Basal leafcells not rufous.

Capsule oval-oblong or subcylindric, mostly with distinct neck. Calyptra generally hairy. Leaves usually entire, very seldom with hairpoint. Plants often pulvinate, usually growing on trees, sometimes on rocks. Habit of *Grimmia.*

B. Leaves generally smooth and not opake; cells nearly uniform. Tufts sometimes loose. Calyptra cucullate. Plants growing in swamps or on rocks.

Fam. 28. **Meeseaceæ.**

Capsule oblique, generally with long neck; endostomial segments free.

Leaves mostly serrate, not or indistinctly limbate, resembling those of *Bryum* in the areolation.

Fam. 29. **Cinclidiaceæ.**

Capsule not oblique; neck short and thick or indistinct; endostomial segments connate above to a convex cupula.

Leaves entire, (usually broadly) limbate, resembling those of *Mnium punctatum.*

Section 2. *Platylepideæ.* Endostomial segments broad, not confluent; teeth articulate. Leaves not complicate.

A. Leaves generally papillose or mamillose; cells sometimes diversiform. Capsule with indistinct or short neck.

Fam. 30. **Bartramiaceæ.**

Calyptra cucullate, entire, not inflate. Capsule subglobose or finally oblique; teeth often without longitudinal line; endostome sometimes with cilia. Tufts dense. Leaves mostly narrow Plants perennial, growing on rocks or in swamps.

B. Leaves generally smooth (in *Aulacomnium* and *Timmia* sometimes papillose); cells polygonal, nearly uniform or gradually passing to the longer basal ones. Capsule often necked.

Fam. 31. **Funariaceæ.**

Calyptra inflate. Peristomial teeth without longitudinal line; endostome without cilia.

Calyptra often split or lobulate at base, mitriform or cucullate. Leaves very thin. Plants generally annual, small and not tufted, growing on earth.

Fam. 32. **Bryaceæ.**

Calyptra not inflate. Peristomial teeth with longitudinal line; endostome often with cilia.

Calyptra entire, cucullate. Plants generally perennial, mostly tufted, growing on earth and stone, sometimes in swamps, less often on trees.

Section 3. *Pseud-Arthrodontæ.* Endostomial segments wholly confluent to a plicate membrane; teeth incompletely articulate or wanting. Leaves not complicate, sometimes very small and nearly indistinct.

Fam. 33. **Buxbaumiaceæ.**

Plants small. Stem often indistinct.

Tribe 2. **Schizocarpous.**

Capsule dehiscing by 4 longitudinal slits, cohering above. Peristome none.

Fam. 34. **Andreæaceæ.**

Leaves often papillose; cells small, the upper short. Capsule blackish. Habit of *Grimmia* (Schistidium).

Tribe 3. **Cleistocarpous.**

Capsule not dehiscing; lid not distinct. Plants mostly small.

Fam. 35. **Bruchiaceæ.**

Leaves narrow; cells elongate. Capsule often (principally in American species) necked. Prothallium often persistent. Habit of *Trematodon* and *Dicranella.*

Fam. 36. **Voitiaceæ.**

Leaves broad, entire and flaccid, smooth; cells large and wide. Capsule without distinct neck. Habit of *Splachnum.*

Fam. 37. **Physcomitrellaceæ.**

Leaves broad, serrate and flaccid, smooth; cells polygonal, nearly uniform, the upper short. Capsule necked. Calyptra inflate. Habit of *Physcomitrium.*

Fam. 38. **Phascaceæ.**

Leaves generally broad, often entire, not seldom papillose; upper cells short. Capsule without neck. Habit of *Pottia.*

Fam. 1. **Cryphæaceæ**

A. Leaves nerveless, generally entire (or indistinctly sinuolate above).

1. *Hedwigia.* Capsule generally terminal, often immersed; peristome none; calyptra submitriform or cucullate, sometimes hairy. Leaves papillose; upper cells suboval-oblong. Monoecious or synoecious.

2. *Leucodon.* Capsule lateral, mostly exserted; teeth whitish; endostome wanting or rudimentary; calyptra cucullate, glabrous. Leaves smooth; upper cells oblong or lanceolate. Dioecious.

B. Leaves costate, sometimes denticulate.

a. Costa of the leaves simple. Monoecious.

3. *Forsstroemia.* Capsule often exserted; peristome simple without endostome; calyptra cucullate, hairy. Leaves indistinctly papillose; upper cells suboval.

4. *Cryphæa.* Capsule immersed; peristome double; calyptra papillose above, mitriform or cucullate. Leaves papillose; upper cells short or elongate.

b. Costa of the leaves divided into 3 or 5 branches. Dioecious.

5. *Antitrichia.* Capsule exserted; peristome double; calyptra cucullate, glabrous. Leaves smooth; upper cells mostly narrow.

Fam. 2. **Anomodontaceæ** (new fam.)

6. *Anomodon.* Endostomial segments mostly short. Leaves generally entire. Stem without paraphyllia. Dioecious.

7. *Lindbergia* (new genus). Endostome wanting. Leaves denticulate at acumen. Stem with paraphyllia. Monoecious.

Fam. 3. **Fabroniaceæ.**

A. Peristome simple, rarely (in one species of *Fabronia*) wanting. Plants small.

a. Leaves serrate or fimbriate. Capsule not annulate; calyptra unripe mitriform, finally split at one side and cucullate.

8. *Fabronia.* Lid of the capsule not rostrate; teeth with longitudinal line, often united in pairs. Costa of the leaves simple or indistinct. Monoecious.

b. Leaves entire or (above) minutely denticulate. Capsule annulate; calyptra cucullate.

9. *Clasmatodon.* Lid of the capsule rostellate; teeth irregular and narrow, generally without longitudinal line, sometimes split below. Leaves sometimes denticulate above; costa simple. Monoecious.

10. *Habrodon.* Lid of the capsule conic, not rostellate; teeth with longitudinal line. Leaves entire, nerveless. Dioecious.

B. Peristome double. Leaves somewhat large.

11. *Anacamptodon.* Lid of the capsule rostellate; teeth united in pairs (as in *Orthotrichum*), with longitudinal line; annulus none; pedicel long. Leaves entire; costa simple. Monoecious.

Fam. 4. **Endotrichaceæ** (new fam.)

12. *Pterobryum.* Leaves nearly entire; inner cells sublinear; costa long and simple.

Fam. 5. **Neckeraceæ.**

13. *Neckera.* Capsule sometimes immersed; cilia wanting. Leaves not truncate above, often undulate; costa mostly short and double. Stem usually pinnate, often with flagellate branches, sometimes with paraphyllia. Mostly dioecious.

14. *Neckeropsis.* Capsule immersed. Leaves truncate, sometimes undulate; costa simple. Stem irregularly branching without flagellæ and paraphyllia. Synoecious. Calyptra sometimes mitriform.

15. *Porotrichum.* Capsule exserted; cilia appendiculate. Leaves neither truncate nor undulate; costa simple. Stem subpinnate with paraphyllia. Dioecious.

Fam. 6. **Leptodontaceæ** (new fam.)

16. *Leptodon.* Capsule scarcely exserted. Leaves not limbate. Branches (secondary stems) involute-circinnate when dry; paraphyllia present.

17. *Macouniella* (new genus). Capsule distinctly exserted. Leaves limbate to the acumen by round-quadrate cells. Branches not circinnate; paraphyllia wanting.

Fam. 7. **Meteoriaceæ.**

18. *Papillaria.* Alar leaf-cells numerous; inner cells dilated; costa short and double.

19. *Meteorium.* Alar leaf-cells few; inner cells sublinear; costa simple.

Fam. 8. **Hookeriaceæ.**

I. *Hookerieæ.* Capsule and pedicel smooth. Upper leaf-cells very dilated.

A. Leaves with 2 long nerves, generally narrowly limbate; upper cells round-hexagonal.

20. *Hookeria.* Leaves smooth; cells large; nerves not spiniform. Calyptra lobulate at base. Monoecious or polygamous.

21. *Callicostella.* Leaves papillose; cells not large; nerves spiniform. Calyptra fringed. Monoecious.

B. Leaves not or obsoletely costate, not distinctly limbate; upper cells oval-hexagonal.

22. *Pterygophyllum.* Leaves smooth; cells large. Calyptra lobulate at base. Monoecious.

II. *Daltonieæ.* Capsule and pedicel rough. Upper leaf-cells suboblong.

23. *Daltonia.* Leaves smooth, broadly limbate; costa long and simple. Calyptra fringed below the narrow point. Monoecious or synoecious.

Fam. 9. **Leskeaceæ.**

A. Leaves with papilliferous cilia.

24. *Thelia.* Leaves strongly papillose, from the broadly round-ovate base abruptly tapering to the long acumen, not recurved; upper and middle cells rotundate; costa short. Stem often with numerous paraphyllia; branches erect and julaceous.

B. Leaves not ciliate.

a. Stem with paraphyllia. Leaves often papillose.

25. *Pteryggynandrum.* Leaves papillose; upper cells suboblong, the inner ones narrower; costa short, simple

or double. Paraphyllia few. Endostomial segments often rudimentary. Dioecious.

26. *Leskea.* Leaves papillose; cells rotundate-quadrate; costa long. Paraphyllia numerous. Endostomial segments rimose. Monoecious.

27. *Lescuræa.* Leaves smooth or (seldom) faintly papillose; cells lanceolate-linear; costa long. Paraphyllia not numerous. Endostomial segments entire, very narrow. Dioecious.

b. Stem without paraphyllia. Leaves smooth; middle and upper cells dilated, suboblong or oval; costa mostly simple.

28. *Myrinia.* Pedicel of the capsule smooth. Leaves entire.

29. *Helicodontium.* Pedicel of the capsule rough. Leaves serrulate.

Fam. 10. **Entodontaceæ** (new fam.)

I. *Apterygieæ.* All leaf-cells narrow, linear; costa indistinct.

30. *Holmgrenia.* Leaves entire, usually shining; lower basal cells mostly orange-colored. Capsule annulate. Stem irregularly divided or simple. Dioecious, rarely fruiting.

II. *Entodonteæ.* Alar leaf-cells subquadrate; middle cells generally narrow; costa short and double or indistinct.

A. Leaves not recurved, mostly obtusate; alar cells usually large

31. *Entodon.* Capsule generally erect; lid often rostrate; annulus mostly broad; endostomial segments lower than the teeth. Mostly monoecious.

B. Leaves recurved, acuminate and acute; alar cells small.

32. *Platygyrium.* Capsule erect; lid seldom rostrate; annulus broad; endostomial segments not lower than the teeth. Alar leaf-cells not numerous. Mostly dioecious.

33. *Tripterocladium.* Capsule often cernuous; lid not rostrate; (annulus not seen); endostome lower than the teeth. Alar leaf-cells numerous. Mostly monoecious.

Fam. 11. Climaciaceæ (new fam.)

A. Capsule symmetric; pedicel smooth. Branch-leaves generally serrate.

I. *Climacieæ.* Branches with numerous paraphyllia. Columella of the capsule exserted. Endostome without cilia.

34. *Climacium.* Inner leaf-cells narrow; alar cells short, numerous, often finally reddish; costa simple. The naked part of the stem usually long; branches simple, fasciculate.

II. *Isothecieæ.* Branches without paraphyllia. Columella of the capsule not exserted. Endostome often with cilia.

35. *Alsia.* Leaves not mamillose; inner cells narrow, the alar ones numerous; costa simple. Cilia of the endostome appendiculate; segments long.

36. *Isothecium.* Leaves (principally the uppermost) mamillose above; inner cells mostly narrow, the upper ones sometimes dilated; alar cells not numerous; costa simple. Cilia of the endostome seldom appendiculate; segments long.

37. *Pterogonium.* Leaves mamillose; inner cells suboval, the alar ones very numerous; costa short and double. Segments of the endostome short; cilia wanting.

B. Capsule generally asymmetric; pedicel sometimes rough. Branch-leaves sometimes entire or denticulate.

III. *Hylocomieæ.* Upper and middle leaf-cells narrow.

38 *Hylocomium.* Endostome with cilia. Pedicel of the capsule often rough. Alar leaf-cells generally not large, sometimes indistinct; costa mostly double. Stem pinnate or bi-tripinnate; the naked part not long; paraphyllia sometimes wanting.

39. *Girgensohnia.* Endostome without cilia. Pedicel of the capsule smooth. Alar leaf-cells very large; costa

simple. Stem bi-tripinnate; the naked part long; paraphyllia numerous.

IV. *Thamnieæ.* Upper leaf-cells generally round-rhombic, the middle suboval.

40. *Thamnium.* Endostome with appendiculate cilia. Pedicel of the capsule smooth. Alar leaf-cells few, small and not much distinct; costa simple. Stem with fasciculate branches or pinnate; the naked part mostly long; paraphyllia none.

Fam. 12. Thuidiaceæ (new fam.)

A. Costa of the leaves short, mostly double, or indistinct.

a. Leaves erect or appressed when moist, not recurved; costa double or indistinct. Capsule suberect. Branches erect; paraphyllia wanting.

41. *Myurella.* Leaves cochleariform; cells rotundate. Branches julaceous.

b. Leaves patent or spreading when moist, sometimes recurved; costa sometimes simple. Capsule usually inclined. Branches decumbent; paraphyllia few or wanting.

42. *Heterocladium.* Leaves spreading and claviculiform or subfalcate when moist, generally dimorphous; those of the stem seldom appressed when dry; middle cells oval-oblong.

43. *Pseudoleskeella* (new genus.) Leaves not spreading when moist, appressed when dry, not seldom homomorphous; cells generally round-oval.

B. Costa of the leaves long and simple, mostly subpercurrent.

44. *Pseudoleskea.* Leaves homomorphous. Stem not regularly pinnate.

Leaves sometimes not papillose, not seldom falcate, mostly patent when dry; cells oval-oblong or narrower. Stem usually with paraphyllia.

45. *Thuidium.* Leaves dimorphous. Stem pinnate.

Leaves usually papillose, not falcate, appressed or crisped when dry; cells mostly round-oval, less often suboblong, seldom narrower. Paraphyllia sometimes wanting.

Fam. 13. **Hypnaceæ.**

A. Capsule generally symmetric and erect, not curved.

I. *Pylaisieæ.* Leaves neither distichous nor falcate; angular or alar cells subquadrate; costa short and double or indistinct. Endostomial segments sometimes partly connate with the teeth; annulus mostly indistinct. Pedicel of the capsule smooth. Monoecious.

46. *Pylaisia.* Endostomial segments reaching above the teeth. Lid of the capsule not rostrate. Alar (angular) leaf-cells small, usually green.

47. *Pylaisiella* (new genus). Endostomial segments lower than the teeth. Lid of the capsule rostrate. Special alar cells sometimes large and pellucid.

B. Capsule generally asymmetric and inclined or curved.

II. *Raphidostegieæ.* Leaves not rarely subdistichous, often incurved or subfalcate, acute, generally acuminate, mostly recurved at the borders; alar cells vesiculiform and rotundate, orange or hyaline; inner cells generally narrow. Capsule usually small; lid rostrate; pedicel smooth.

48. *Raphidostegium.* Leaves usually small; costa mostly indistinct. Stem without paraphyllia.

III. *Plagiothecieæ.* Leaves generally distichous or subdistichous by the complanate branches, not curved, seldom recurved at the borders; alar cells polygonal or indistinct; inner cells generally narrow. Lid of the capsule sometimes rostrate; pedicel usually smooth. Stem sometimes (in some species of *Rhynchostegium*) with paraphyllia.

a. Leaves mamillose above.

49. *Rhynchostegium.* Leaves acuminate and acute; cells not seriate; costa often simple. Lid of the capsule usually rostrate. Stem often with paraphyllia.

50. *Taxithelium.* Leaves obtusate or short-acuminate; cells seriate; costa indistinct. Lid of the capsule not rostrate. Stem without paraphyllia.

b. Leaves not mamillose. Stem without paraphyllia.

51. *Plagiothecium.* Lid of the capsule usually not rostrate. Alar leaf-cells not numerous, often indistinct; apical cells narrow; costa mostly indistinct or short and double.

52. *Stereophyllum.* Lid of the capsule rostellate. Alar leaf-cells small but very numerous; upper cells suboval; costa long and simple.

IV. *Amblystegieæ.* Leaves neither distichous nor falcate, rarely recurved at the borders; alar cells polygonal or indistinct; middle cells generally oval-oblong. Lid of the capsule not rostrate; pedicel smooth. Stem without paraphyllia. — Tufts usually not shining. Leaves mostly small.

53. *Amblystegium.* Leaves not limbate, all acuminate and acute; costa often short and double (or indistinct).

54. *Platyloma* (new genus). Leaves broadly limbate by linear cells, those of the branches obtusate; costa long and simple.

V. *Hypneæ.* Leaves generally not distichous, often falcate; alar cells polygonal or indistinct; upper and middle cells generally narrow. Lid of the capsule often rostrate; pedicel often rough. Stem less often with paraphyllia.

Here belonging genera are rather subgenera of *Hypnum* and not wholly distinct.

a. Leaves generally obtusate (at least those of the stem), not triangular; costa often short and double. Lid of the capsule not rostrate; pedicel smooth. Stem without paraphyllia.

55. *Calliergon* (new genus). Leaves of the branches sometimes falcate.

b. Leaves acuminate and acute, generally triangular, not falcate; costa long and simple. Lid of the capsule often apiculate; pedicel usually rough. Stem rarely (in one species) with paraphyllia.

56. *Camptothecium.* Leaves plicate below, recurved at the borders; alar cells small, generally impressed at the basal angles. Capsule sometimes straight. Tufts often shining. Mostly dioecious.

c. Leaves acuminate and acute, arrounded or decurrent at base, not triangular, rarely falcate; costa generally long and simple. Lid of the capsule often rostrate; pedicel often rough. Stem rarely (in few species) with paraphyllia.

57. *Eurhynchium.* Leaves mamillose above (at least the younger ones), rarely plicate, not or faintly (near the base) recurved; costa simple. Lid of the capsule often rostrate; pedicel often rough. Stem often pinnate.

58. *Brachythecium.* Leaves not mamillose above, often plicate in the middle and recurved at the borders; costa simple. Lid of the capsule rarely (in few species) rostrate; pedicel often rough. Stem generally not regularly pinnate.

59. *Campylium.* Leaves not mamillose above, not plicate, generally not recurved, often spreading; costa mostly short and double (or indistinct). Lid of the capsule not rostrate; pedicel smooth. Stem sometimes pinnate; paraphyllia wanting.

d. Leaves acuminate and acute, neither triangular nor falcate; costa short and double or indistinct. Lid of the capsule often rostrate; pedicel smooth. Stem usually with numerous paraphyllia.

60. *Heterophyllon* (new genus). Leaves mamillose above.

e. Leaves acuminate or apiculate, acute, not falcate, with a cordate, broadly auricled base; costa simple, double or indistinct. Lid of the capsule rostrate; pedicel smooth. Stem without paraphyllia.

61. *Myurium.* Branches julaceous. Plants robust. Areolation of the leaves variable.

f. Leaves acute and subulate-acuminate, generally falcate. Lid of the capsule rarely rostrate; pedicel smooth or (in one species) faintly rough above. Stem sometimes with paraphyllia.

62. *Hypnum.* Leaves often mamillose above, less often recurved at the borders. Stem often pinnate.

Fam. 14. **Fontinalaceæ.**

I. *Fontinaleæ.* Leaves nerveless, not falcate. Capsule immersed; lid not often rostrate; calyptra conic.

63. *Fontinalis.* Peristome long. Leaves not limbate, often tristichous; alar cells more or less distinct. Dioecious or (rarely) paroecious.

II. *Dichelymeæ* Leaves costate and falcate. Capsule mostly exserted; lid rostrate; calyptra cucullate.

64. *Dichelyma.* Capsule mostly exserted; teeth long; calyptra large. Leaves usually not limbate; alar cells nearly indistinct; costa often excurrent. Dioecious.

65. *Brachelyma.* Capsule immersed; teeth short; calyptra very small and short. Leaves limbate; costa not excurrent.

Fam. 15. **Schistostegaceæ.**

66. *Schistostega.* Capsule pedicellate, subglobose.

Fam. 16. **Eustichiaceæ.**

67. *Eustichia.* Capsule pedicellate, globose.

Fam. 17. **Polytrichaceæ.**

A. Leaves limbate by narrow cells, not sheathing.

68. *Catharinea.* Leaves not lamelliferous at back, not contracted above the base, usually long, always flaccid, crisped when dry; lamellæ few, not sinuolate. Capsule symmetric without angles and appendage (apophysis), not papillose; calyptra glabrous or at apex rough, long-acuminate. Sometimes paroecious, mostly dioecious.

B. Leaves not limbate, usually sheathing. Dioecious.

a. Leaves with sinuolate or serrate lamellæ.

69. *Oligotrichum.* Leaves lamelliferous on both sides, not contracted above the base, more or less crisped; lamellæ not numerous, those of the upper side sinuolate, those of the under side usually serrate. Capsule subsymmetric without angles and apophysis; calyptra sparingly hairy or glabrous.

70. *Psilopilum.* Leaves not lamelliferous at back, contracted above the base, rigid; lamellæ numerous, sinuolate. Capsule asymmetric without angles and apophysis; calyptra glabrous.

71. *Bartramiopsis* (new genus). Leaves not lamelliferous at back, long-ciliate near the sheathing base, flaccid, more or less crisped when dry; lamellæ few, serrate. Capsule without angles and apophysis; teeth, lid and calyptra unknown.

b. Leaves lamellate only at the upper side; lamellæ neither sinuolate nor serrate.

72. *Catharinella* (new genus). Leaves not contracted above the (more or less or not sheathing) base, flaccid, crisped when dry; lamellæ numerous, not densely cohering. Capsule papillose without angles and apophysis; calyptra densely hairy, short-acuminate.

73. *Polytrichum.* Leaves abruptly contracted above the distinct sheath, often rigid, sometimes incurved, not crisped; lamellæ densely cohering, seldom (in one species) few (about 10), otherwise numerous. Capsule smooth or papillose, often with angles and apophysis; calyptra densely hairy with a not long acumen, rarely (in one species) sparingly hairy and long-acuminate.

Fam. 18. **Georgiaceæ.**

74. *Georgia.* Capsule exserted. Leaves smooth; cells small, the upper short, hexagonal or oval. Plants small, sometimes minute.

Fam. 19. **Fissidentaceæ.**

75. *Fissidens.* Peristomial teeth united in pairs,

cleft. Pedicel of the capsule exserted. Leaves usually approached.

76. *Conomitrium.* Peristomial teeth not united in pairs, entire or cleft. Pedicel of the capsule immersed. Leaves very loosely disposed.

Fam. 20. **Splachnaceæ.**

I. *Splachneæ.* Peristome present. Leaves not opake.

A. Capsule with a (mostly thicker) swollen neck or an umbraculiform appendage (apophysis) of different color; pedicel flaccid; teeth not split, usually deflexed and appressed when dry. Spores small. Calyptra mostly conic. Leaves not recurved, often subulate-acuminate; costa not excurrent.

77. *Splachnum.* Peristomial teeth united below, formed by 3 layers; columella exserted. Tufts loose. Usually dioecious.

78. *Haplodon* (new genus). Peristomial teeth distant, formed by 2 layers; columella not exserted. Tufts dense. Monoecious.

B. Capsule with a swollen neck of same color; pedicel rigid. Calyptra subcucullate. Tufts usually dense.

a. Leaves subulate-acuminate, not recurved; costa often excurrent. Capsule narrower than the neck; teeth usually deflexed and appressed when dry; columella not exserted.

79. *Tetraplodon.* Peristomial teeth united below, formed by 2 layers. Usually monoecious. Spores small.

b. Leaves not subulate-acuminate, more or less distinctly recurved below; costa rarely (in one species) excurrent. Capsule thicker than the neck; teeth often erect; columella often exserted.

80. *Dissodon.* Capsule with a claviform neck; teeth entire, erect when dry. Leaves obtusate and obtuse, entire or indistinctly denticulate above. Spores large, about 0,03 or 0,04 mm. Sometimes synoecious.

81. *Tayloria.* Capsule with a subcylindric neck;

teeth sometimes (in *T. splachnoides*) partite, mostly deflexed when dry. Leaves acuminate, serrate above. Spores small. Monoecious.

II. *Oedipodieæ.* Peristome wanting. Leaves opake. Pedicel of the capsule confluent with the neck.

82. *Oedipodium.* Pedicel and neck of the capsule tubular, whitish green, not rigid. Leaves obtuse and entire, with long cilia at base; costa broad. Sometimes synoecious.

Fam. 21. **Dicranaceæ.**

A. Peristomial teeth 8.

I. *Octoblephareæ.* Peristomial teeth entire, short and pale yellowish. Capsule straight; pedicel short. Leaves whitish and rigid, not mamillose; marginal cells numerous at the base; costa very broad.

83. *Octoblepharum.* Plants small.

B. Peristomial teeth 16. Leaves whitish, nearly filled by the costa; marginal cells obsolete.

II. *Leucobryeæ.* Capsule curved; teeth bifid, long and red; pedicel long. Leaves not mamillose, plurifarious.

84. *Leucobryum.* Plants generally robust.

C. Peristomial teeth 16. Leaves green, with distinct cells on both sides of the costa.

a. Leaves distichous.

III. *Distichieæ.* Capsule erect or inclined; teeth cleft. Leaves sheathing; lower cells narrow, the upper quadrate; alar cells not defined.

85. *Distichium.* Leaves long and narrow; costa long-excurrent.

b. Leaves plurifarious.

a a. Leaf-cells dilated, the upper obliquely polygonal.

IV. *Aongstroemieæ.* Capsule straight, very small; teeth cleft. Leaves not mamillose, short and obtuse.

86. *Aongstroemia.* Capsule ovoid, not striate. Plants very small.

b b. Leaf-cells narrow, at least the lower ones; the upper rectangular, quadrate or suboblong-oval.

V. *Trematodonteæ.* Capsule curved; teeeth cleft or entire. Leaves not mamillose; alar cells not defined. Differs from other *Dicranaceæ* in the long neck of the capsule.

87. *Trematodon.* Leaves mostly narrow.

VI. *Ditricheæ.* Capsule generally straight; teeth partite with subfiliform legs. Leaves not mamillose, narrow; cells narrow, the alar seldom distinct.

88. *Ditrichum.* Capsule usually not sulcate when dry. Habit of *Dicranella.*

VII. *Cynodontieæ.* Capsule oblique or straight; teeth cleft (in *Cynodontium schisti* mostly entire). Leaves mamillose, mostly recurved, denticulate; upper cells subquadrate; alar cells generally not well-defined; costa narrow, not excurrent. Calyptra not fimbriate.

89. *Cynodontium.* Leaves not sheathing. Capsule mostly sulcate.

90. *Dichodontium.* Leaves sheathing. Capsule not sulcate.

VIII. *Dicraneæ.* Capsule curved or straight; teeth cleft or (in few species) partite with subulate legs. Leaves generally not mamillose and not recurved, denticulate or entire; alar cells (exc. some species of *Campylopus*) well-defined. Leaves generally setiform and somewhat rigid, sometimes crisped when dry. Plants mostly robust.

91. *Dicranum.* Calyptra not fimbriate. Leaves without hairpoint; alar cells distinct; costa mostly narrow, not often long-excurrent. Pedicel of the capsule (exc. 2 species) straight.

92. *Campylopus.* Calyptra fimbriate at base. Leaves sometimes with hairpoint; alar cells sometimes not defined; costa mostly very broad and long-excurrent. Pedicel of the capsule arcuate or flexuous. Not often fruiting.

IX. *Dicranelleæ.* Capsule curved or straight; teeth cleft or entire. Leaves not mamillose, sometimes recurved, denticulate or entire; alar cells not often distinct;

costa mostly narrow. Plants generally not large (exc. *Oncophorus* and *Oreas*).

* Peristomial teeth cleft.

93. *Dicranella.* Capsule mostly curved, sometimes strumose, often sulcate when dry. Leaves narrow, often entire, sometimes sheathing; cells generally narrow, the alar not (exc. *D. rubra*) defined; costa often excurrent, seldom broad.

94. *Dicranoweisia.* Capsule straight and not strumose (or, in one species, slightly curved and substrumose), not sulcate. Leaves narrow, entire, not sheathing; upper cells short; alar cells mostly distinct; costa narrow, rarely excurrent.

95. *Oncophorus.* Capsule curved, strumose, not sulcate. Leaves with a very broad and sheathing base, often entire; upper cells short; alar cells not defined; costa narrow, not excurrent. Plants mostly large.

** Peristomial teeth us. entire. Capsule straight, striate, not strumose. Leaves narrow, denticulate; upper cells short.

96. *Rhabdoweisia.* Capsule terminal; pedicel straight. Costa of the leaves not excurrent. Plants small.

97. *Oreas.* Capsule lateral or sublateral; pedicel arcuate. Costa of the leaves excurrent. Plants generally large.

Fam. 22. **Seligeriaceæ.**

I. *Seligerieæ.* Alar leaf-cells not distinct. Plants very small, generally not tufted. Monoecious.

98. *Seligeria.* Calyptra cucullate. Peristome usually well-evolute, in one species wanting.

99. *Brachydontium.* Calyptra submitriform and lobate. Peristome rudimentary. Habit of *Seligeria.*

100. *Trochobryum.* Peristome rudimentary; teeth very short and truncate. Calyptra cucullate. Leaves with a very long-excurrent costa.

II. *Blindieæ.* Alar leaf-cells dilated, generally quadrate. Plants larger than the *Seligerieæ*, tufted. Usually dioecious.

101. *Blindia.* Peristome well-wolute or wanting. Habit of *Dicranella.*

Fam. 23. **Grimmiaceæ.**

A. Capsule thin-walled, generally terminal; lid soon deciduous, not thick.

1. *Grimmieæ.* Lower leaf-cells rectangular or quadrate. Spores not large.

a. Calyptra not plicate, mitriform or (sometimes in *Grimmia*) cucullate. Leaves not (exc. *Grimmia cæspiticia*) distinctly sulcate. Capsule exserted or (sometimes in *Grimmia*) immersed.

102. *Grimmia.* Peristome short; teeth often entire, rarely rudimentary or wanting. Leaves often with hairpoint; cells (seldom all) sometimes with sinuous walls, diversiform. Pedicel of the capsule generally not long, sometimes curved. Stem mostly erect.

103. *Racomitrium.* Peristome long; teeth usually partite. Leaves often with hairpoint; cells (mostly all, exc. the alar ones) with sinuous walls, generally diversiform. Pedicel of the capsule straight, generally long. Stem mostly decumbent or ascending.

104. *Campylostelium.* Peristome long; teeth more or less cleft, incurved when dry. Leaves without hairpoint; cells rectangular with not sinuous walls. Pedicel of the capsule often curved. Stem erect and simple. Habit of *Seligeria*.. Plants very small.

b. Calyptra plicate, mitriform. Leaves often sulcate; cell-walls not sinuous. Stem erect.

105. *Coscinodon.* Capsule immersed. Leaves with a long hairpoint, not crisped when dry. Dioecious or monoecious. Habit of *Grimmia pulvinata.*

106. *Brachysteliun.* Capsule exserted. Leaves without hairpoint, crisped when dry. Monoecious. Habit of *Orthotrichum* (Ulota.)

II. *Drummondieæ.* Leaf-cells rotundate. Spores very large.

107. *Drummondia.* Capsule exserted; teeth rudimentary; pedicel straight. Calyptra concave, involving the capsule, finally cucullate. Leaves without hairpoint; cellwalls not sinuous. Stem decumbent; branches short and erect. Habit of *Orthotrichum.*

B. Capsule thick-walled, sublateral on short branches; lid thick, long-persistent upon the thick and elevate columella.

III. *Scoulerieæ.* Capsule immersed, very broad and cupuliform; calyptra cucullate.

108. *Scouleria.* Capsule small-mouthed when young, blackish when dry; teeth very short and brittle, finally often adhering to the lid. Leaves dentate, without hairpoint; the lower ones, when emarcid, with persistent costa; cellwalls not sinuous. Spores very large, about 0,05—0,06 mm. Stem branching, floating in water. Plants robust. Dioecious. Habit of *Cinclidotus.*

Fam. 24. **Weisiaceæ.**

A. Peristome not cancellate.

I. *Barbuleæ.* Peristomial teeth partite to the basal (often tessellate, more or less distinct) tube, with hair-like, mostly long and often contorted branches. Capsule without distinct neck, generally straight.

* Leaves without lamellæ on the costa.

109. *Barbula.* Capsule symmetric, straight or (rarely) faintly curved; teeth not incurved. Leaves usually papillose; cell-walls not sinuous.

110. *Ceratodon.* Capsule (more or less) asymmetric, usually curved; teeth incurved when dry, not contorted. Leaves smooth; cell-walls not sinuous.

111. *Geheebia.* Leaves papillose; cell-walls sinuous. Capsule unknown. Plants robust.

** Leaves with lamellæ or brood-filaments on the costa, papillose.

112. *Aloina.* Peristome contorted. Leaves strongly involute above; filaments very numerous; costa very broad. Stem very short. Pedicel of the capsule long.

113. *Crossidium.* Peristome usually contorted. Leaves reflexed or flat at the borders, imbricate; filaments numerous; costa narrow.

114. *Pterygoneuron.* Peristome not contorted, mostly wanting. Leaves imbricate, not involute; lamellæ few; costa narrow. Monoecious.

II. *Didymodonteæ.* Peristomial teeth not partite but more or less cleft (or in *Pottia* entire), with longitudinal line, not contorted but sometimes half-twisted; basal tube very short. Leaves without lamellæ on the costa.

* Capsule symmetric without distinct neck.

115. *Didymodon.* Peristomial teeth more or less cleft. Leaves usually papillose, generally broader near the base. Habit of *Barbula* (Eu-Barbula).

116. *Pottia.* Peristomial teeth not cleft, often rudimentary or wanting. Leaves broader above the middle, often smooth. Habit of *Barbula* (Tortula).

** Capsule oblique or arcuate with a thick neck.

117. *Dermatodon.* Peristomial teeth cleft. Leaves papillose, broader above the middle. Habit of *Ceratodon.*

III. *Weisieæ.* Peristomial teeth without longitudinal line, not twisted, generally short and entire (rarely cleft), sometimes wanting; basal tube not distinct. Leaves without lamellæ.

118. *Weisia.* Capsule without neck, generally straight and symmetric. Leaves usually papillose, not limbate, not seldom involute above, often crisped when dry.

IV. *Syrrhopodonteæ.* Peristomial teeth without longitudinal line and basal tube, not twisted, short and entire. Leaves bilamellate at the borders or limbate, often with propagula.

119. *Syrrhopodon.* Capsule straight and symmetric, subcylindric, narrowed above to the mouth, long-

rostrate, not or indistinctly necked; pedicel elongate. Leaves sheathing and channelled, denticulate, crisped when dry; basal cells, at least the inner ones, hyaline; costa not excurrent. Dioecious, rarely fruiting.

B. Peristome cancellate at base, divided above in filiform, more or less cohering branches.

V. *Cinclidoteæ.* Leaves without lamellæ, often smooth; borders thick. Dioecious.

120. *Dialytrichia.* Capsule terminal on the stem; pedicel long; teeth faintly twisted. Leaves papillose, obtuse.

121. *Cinclidotus.* Capsule placed on small lateral branches, often nearly immersed; pedicel short; teeth not or scarcely twisted. Leaves generally smooth, often acute.

Fam. 25. **Calymperaceæ.**

122. *Calymperes.* Capsule oval; pedicel short. Leaves not sheathing, suboblong, entire and convolute, rigid when dry, often with propagula; basal cells, at least the inner ones, hyaline. Dioecious. Habit of *Syrrhopodon.*

Fam. 26. **Encalyptaceæ.**

123. *Encalypta.* Leaves very papillose above. Peristome variable or wanting.

124. *Merceya.* Leaves smooth or indistinctly papillose. Capsules unknown.

Fam. 27. **Orthotrichaceæ.**

I. *Orthotricheæ.* Capsule terminal, often immersed; peristome generally double; segments usually ciliiform; calyptra mitriform. Leaves usually papillose, often crisped; inner cells not seriate; alar cells sometimes subquadrate; costa not excurrent. Stem generally erect and sparingly branching, seldom decumbent. Tufts often pulvinate.

125. *Orthotrichum.* Calyptra generally plicate and hairy.

II. *Macromitrieæ.* Capsule lateral, not immersed; calyptra subcampanulate. Leaves indistinctly papillose; cells obliquely seriate, the alar not defined. Stem creeping; branches numerous.

126. *Macromitrium.* Capsule plicate; teeth rudimentary or wanting; calyptra plicate. Leaves seldom crisped when dry; costa not excurrent.

127. *Schlotheimia.* Capsule not plicate; peristome double or wanting; calyptra generally not plicate. Leaves slightly crisped; costa excurrent to a thick point.

III. *Zygodonteæ.* Capsule terminal or lateral; calyptra cucullate, not plicate, glabrous. Leaves papillose, often crisped; costa sometimes excurrent. Stem erect.

128. *Zygodon.* Capsule terminal, striate; peristome double or wanting.

129. *Anoectangium.* Capsule lateral, not striate; peristome none.

Fam. 28. **Meeseaceæ.**

I. *Meeseeæ.* Capsule asymmetric, terminal; peristome double.

A. Leaves mamillose Peristomial teeth long.

130. *Paludella.* Leaves sheathing, deflexed when moist.

B. Leaves not mamillose. Peristomial teeth (exc. *Plagiobryum Zierii*) shorter than the endostome.

a. Upper leaf-cells small, subquadrate. Stem mostly high.

131. *Meesea.* Pedicel of the capsule long. Leaves not appressed when dry.

b. Upper leaf-cells large, rhombic-polygonal. Stem low.

132. *Amblyodon.* Calyptra inflate. Male flowers with claviform paraphyses. Pedicel of the capsule long. Leaves not appressed when dry.

133. *Plagiobryum.* Calyptra not inflate. Paraphyses filiform. Pedicel of the capsule short. Leaves appressed when dry.

II. *Mielichhoferieæ.* Capsule symmetric, usually lateral; exostome or endostome mostly rudimentary.

134. *Mielichhoferia.* Leaves very small, imbricate

and appressed, not mamillose; cells subrectangular, the lower ones larger and subquadrate. Habit of *Bryum filiforme*. Dioecious.

III. *Orthodontieæ*. Capsule symmetric, terminal, with a long and narrow neck; endostomial segments ciliiform without distinct basilar membrane; teeth much longer.

135. *Orthodontium*. Leaves setiform; cells subrectangular. Stem low.

Fam. 29. **Cinclidiaceæ** (new fam).

136. *Cinclidium*. Peristomial teeth short. Leaves large and broad; cells large, round-hexagonal, often red.

Fam. 30. **Bartramiaceæ**.

I. *Bartramieæ*. Capsule (when operculate) subglobose; teeth not united above; lid not rostrate. Leaves not appressed when moist, generally papillose (in *Bartramia Oederi*, *Anacolia Menziesii*, *Catoscopium* and *Bartramidula* smooth).

A. Capsule striate; segments usually present.

137. *Breutelia*. Leaves plicate, sheathing, squarrose, not recurved; cells rectangular. Male flowers discoid. Dioecious.

138. *Bartramia*. Leaves not plicate, often sheathing, not rarely recurved, long and uniform; cells rectangular (or the uppermost quadrate), the lower not more dilated. Monoecious or synoecious. Male flowers gemmiform.

139. *Philonotis*. Leaves sometimes plicate at the base, not sheathing, often recurved, mostly diversiform; cells rectangular, the lower more dilated. Monoecious or dioecious. Male flowers discoid or gemmiform.

B. Capsule not striate; segments wanting.

a. Capsule without distinct neck. Leaves serrulate. Habit of *Philonotis*.

140. *Anacolia*. Pedicel of the capsule sublateral, not or slightly curved. Peristomial teeth sometimes pre-

sent. Leaves recurved, plicate below. Dioecious. Male flowers gemmiform.

141. *Bartramidula.* Pedicel of the capsule terminal, curved. Peristome none. Leaves neither recurved nor plicate. Synoecious.

b. Capsule with distinct neck. Leaves entire.

142. *Catoscopium.* Capsule terminal, very small; teeth present; pedicel straight. Leaves not plicate. Dioecious.

II. *Conostomeæ.* Capsule suboval; teeth united above; lid rostrate. Leaves appressed also when moist, very rigid.

143. *Conostomum.* Leaves 5-farious, not sheathing, nearly smooth, very short. Capsule striate; endostome wanting. Tufts glaucous green. Dioecious.

Fam. 31. **Funariaceæ.**

I. *Funarieæ.* Leaves costate. Prothallium not persistent.

144. *Funaria.* Capsule exserted, often asymmetric; peristome double or simple; calyptra cucullate.

145. *Physcomitrium.* Capsule symmetric, mostly exserted; peristome wanting or (in one species) simple; calyptra mitriform, plurilobate at base.

146. *Pyramidula.* Capsule symmetric, slightly exserted; peristome wanting; calyptra tetragonal, contracted below the capsule. Plants very small.

II. *Disceliece.* Leaves nerveless. Prothallium persistent.

147. *Discelium.* Capsule asymmetric, subglobose, long-exserted; peristome simple. Stem nearly indistinct Leaves very small.

Fam. 32. **Bryaceæ.**

A. Stem tree-like, regularly branching above.

I. *Leucolepideæ.* Leaves smooth. Capsule terminal.

148. *Leucolepis.* Stem-leaves (principally above) with elongate cells; branch-leaves with round-polygonal, small cells. Capsule symmetric; endostome orange; cilia not appendiculate. Habit of *Thamnium.*

B. Stem not tree-like.

a. Capsule lateral.

II. *Rhizogonieæ.* Capsule asymmetric and curved.

149. *Rhizogonium.* Leaves smooth, setiform; upper cells small and rotundate, the basal ones subquadrate.

b. Capsule terminal.

aa. Leaves sheathing; upper cells usually papillose.

III. *Timmieæ.* Capsule symmetric. Leaf-cells small, round-hexagonal.

150. *Timmia.* Capsule not striate. Habit of *Polytrichum.*

bb. Leaves not sheathing, smooth or (in some species of *Aulacomnium*) papillose above.

IV. *Aulacomnieæ.* Leaves usually papillose; cells small, generally rotundate. Capsule often asymmetric, usually striate when dry.

151. *Aulacomnium.* Stem often with pseudopodia (sterile gemmiform shoots).

V. *Mnieæ.* Leaves smooth; cells polygonal, mostly large. Capsules generally symmetric, not striate, often clustered Subterranean stem generally rhizomatic, often stoloniferous. Lowest leaves mostly squamiform. Tufts generally loose.

152. *Mnium.* Capsules symmetric, often clustered; endostome orange; cilia not or indistinctly appendiculate. Leaves serrate or entire; cells nearly uniform, generally round-hexagonal, in one species suboval-oblong. Paraphyses claviform.

153. *Roellia* (new genus). Capsule symmetric, solitary; endostome hyaline; cilia not appendiculate. Leaves serrate; cells diversiform, mostly oblong-lanceolate or the uppermost oblong-oval. Male flowers unknown.

154. *Rhodobryum.* Capsules more or less asymme-

tric, often clustered; endostome orange; cilia long-appendiculate. Leaves serrate; cells diversiform, mostly narrow, the lower long-rectangular, the uppermost oblong-oval or hexagonal. Paraphyses filiform.

VI. *Bryeæ.* Leaves smooth; cells polygonal, mostly not large. Capsule solitary, not striate. Stem neither rhizomatic nor stoloniferous. Lower leaves not squamiform. Tufts generally dense.

155. *Bryum.* Capsule symmetric or (less often) asymmetric; endostome generally pale or pale-yellow; cilia often appendiculate. Leaves often entire; cells diversiform, the lower (or all) more or less elongate, the upper seldom round-hexagonal. Paraphyses filiform.

156. *Leptotheca.* Capsule symmetric; teeth very long and narrow.

Fam. 33. **Buxbaumiaceæ.**

157. *Buxbaumia.* Capsule pedicellate; peristome double. Leaves nerveless, nearly indistinct.

158. *Diphyscium.* Capsule immersed; exostome none. Leaves costate, diversiform; the perichetial large.

Fam. 34. **Andreæaceæ.**

159. *Andreæa.* Leaves usually blackish or brownish when dry. Tufts loosely cohering. Growing on rocks, sometimes in running water.

Fam. 35. **Bruchiaceæ.**

I. *Bruchieæ.* Stem distinct. Leaves costate, smooth or (sometimes in *Bruchia*) obsoletely papillose.

A. Capsule pedicellate, neck often distinct. Spores $0{,}02$—$0{,}04$ mm. Prothallium seldom persistent.

160. *Bruchia.* Capsule often exserted; columella persistent. Calyptra mostly campanulate, sometimes split at one side. Leaves usually crowded.

161. *Pleuridium.* Capsule usually immersed, mostly ovoid; columella usually persistent. Calyptra mostly subcucullate. Leaves usually distant.

B. Capsule not pedicellate, without neck. Spores very large, 0,1 - 0,2 mm. Prothallium not persistent.

162. *Archidium.* Capsule globose; columella wanting. Calyptra rudimentary or irregularly splitting. Leaves often distant.

II. *Ephemereæ.* Stem wanting or indistinct. Leaves often nerveless, smooth or (seldom) papillose-spinulose. Capsule globose without neck, immersed. Prothallium persistent. Plants minute.

A. Leaves smooth.

163. *Ephemerum.* Capsule not or indistinctly pedicellate; columella rudimentary or complete, more or less fugacious. Calyptra campanulate or (in one species) subcucullate. Leaves often nerveless. Spores 0,02 — 0,08 mm. Prothallium abundant. Dioecious.

164. *Nanomitrium.* Capsule not pedicellate, columella wanting. Calyptra campanulate-mitriform, very small. Leaves nerveless. Spores about 0,03 mm. Prothallium not abundant. Paroecious.

B. Leaves papillose-spinulose on both sides and on the costa.

165. *Ephemeridium* (new genus). Capsule indistinctly pedicellate; columella wanting. Calyptra campanulate, somewhat large. Spores 0,02 mm or larger. Prothallium not abundant. Dioecious.

Fam. 36. **Voitiaceæ.**

166. *Voitia.* Capsule oval-oblong or globose.

Fam. 37. **Physcomitrellaceæ.**

167. *Physcomitrella.* Capsule subglobose, irregularly splitting. Calyptra split or faintly crenulate at base, scarcely covering the point of the capsule.

168. *Aphanorhegma.* Capsule globose or oval, regularly and horizontally splitting. Calyptra lobulate, covering more than the point of the capsule.

Fam. 38. **Phascaceæ**

169. *Phascum.* Capsule apiculate, rostellate, mamillate or muticous. Calyptra mitriform or cucullate. Leaves generally reflexed at the borders, seldom involute; costa usually excurrent.

European genera, not hitherto found in N. America, are: *Daltonia, Oreas, Bartramidula, Breutelia, Trochobryum, Geheebia, Orthodontium.*

* * *

Species
of
European and Northamerican Bryineæ (Mosses)

synoptically described
by
N. Conr. Kindberg.

Part 1.
Pleurocarpous

Linköping,
Linköpings Lithografiska Aktiebolag
1896

Preface.

Since the publication of Schimpers Synopsis muscorum europæorum (1876) and Manual of the mosses of N. America by Lesquereux and James (1884), the bryology is enriched by many new species. Also several very important bryological manuals, viz. by Boulay, Braithwaite, Husnot and Limpricht, have contricontributed to a more complete knowledge of the mosses.

The present treatise is an essay to revise and compare all hitherto known species and subspecies of Bryineæ, found in Europe and N. America. Excluded species are regarded as varieties or not sufficiently known.

I believe that the greatest importance is to attache to the natural affinity of such species as could be joined to common types (subgenera or groups). Affinity is not to be defined through a few artificial characters, stated »a priori». It needs therefore to select characters, peculiar and constant to each genus. Some characters are in some genera variable, but in others constant. I have therefore not described selected specimens in all their parts but generally omitted such characters, as evidently are too variable. When some species are critical or hitherto not well-known, I have tried to propose all their necessary distinctive characters.

To facilitate the determination of sterile specimens, so often occurring, I have accurately described the areolation of the leaves and the common habit of the vegetals.

My descriptions are not transscribed from other authors but based on my own microscopical researches and studies in nature. I have therefore in Europe visited northern and southern districts and their different regions up to the glaciers and the perennial snow, also augmented my collections through contributions by many correspondents. The geographic distribution and the stations of N. American mosses are accurately observed principally by Prof. J. Macoun, D:r J. Roell and the Rev:d A. C. Waghorne, also (in Greenland) by Prof. S. Berggren.

In some few cases, when I not have had occasion to examine specimens of a very rare species, I must cite the descriptions of their authors or describe the species following good drawings, viz. Icones muscorum by Sullivant.

About 1600 species and 340 subspecies are described in my manuscript.

Common to Europe and N. America about	620 species.
Peculiar to N. America	635 »
Peculiar to Europe	345 »
	1600 species.

In America are found about 1255 species, in Europe 965.

Linkœping, Sweden dec. 1896.

The author.

As the continuation of this treatise, ready as manuscript, depends upon a sufficient number of subscribers (at least 50), the honored subscribers are requested to inform my publishers of their wishes, namely

Messrs P. M. Sahlstrœm & C:o,
Linkœping, Sweden.

Prize: 8 swedish crowns or »kronor» (= 9 shillings, 9 reichsmark, 11 francs) for the first part, Pleurocarpous; for the whole work 20 swed. crowns.

The subscribers shall obtain also my »Genera of european and northamerican Bryineæ, synoptically disposed».

The whole edition comprises only 200 copies. All can be printed before the fine of next year.

Abbreviations: *us.* usually; *gen.* generally; *princ.* principally; *r.* rarely; *Can.* Canada; *Eur.* Europe.

Fam. 1. **Cryphæaceæ.**

1. **Hedwigia** Ehrhart.

I. **Eu-Hedwigia.** Capsule immersed. Leaves us. denticulate at acumen. Stem r. flagelliferous. Tufts us. glaucous green.

II. **Braunia.** Capsule exserted. Leaves entire. Stem often flagelliferous. Tufts brown. Perichetial leaves not ciliate.

I. Eu-Hedwigia.

1. **H. albicans** Weber. — Fontinalis Web.; Hedwigia Lindberg.

Leaves broadly ovate-lanceolate or ovate-oblong, distinctly papillose, hyaline at the denticulate, us. prolonged acumen, recurved below; upper cells us suboblong, sinuous at the walls. Perichetial leaves long-ciliate. Capsule piriform, wholly immersed. Stem not flagelliferous. — On stone, common (r. in northern alps). *Eur.**) Sweden, Norway, Germany, Switzerland! *Amer.* Canada: Macoun. »U. S.»: Lesq. et Jam. man.

* **H. subnuda** Kindberg catal. Canad. musci.

Leaves green, broad-ovate, indistinctly hyaline at the short and nearly entire acumen, recurved nearly all around; upper cells subquadrate. -- Rocks r. *Amer.* Canada: Macoun.

2. **H. imberbis** Esenbeck et Hornschuch. — Schistidium Es. et Hsch.; Hedwigia Spruce.

Leaves subovate, faintly papillose, entire, not hyaline, recurved; upper cells suboblong, sinuous. Perichetial leaves not ciliate. Capsule round-oval, subemergent. Stem often flagelliferous; leaves of the flagellæ hyaline at apex. — Rocks r.; *Eur.* France!

II. Braunia Schimper.

3. **H. alopecura** Bridel. — Leucodon Brid.; Hedwigia Kindb.

Leaves ovate, faintly papillose, not hyaline, striate; cells less distinctly sinuous, the upper quadrate, the inner basal rectangular. Capsule oblong without neck; pedicel short. — Stones r.; *Eur.* Austria: Venturi.

4. **H. californica** Lesq. — Braunia Lesq., Sull. icon. m., Hedwigia Kindb.

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*) The mark! indicates, that the author is the collector; the cited collectors have contributed to my collections.

Leaves distinctly papillose, from subovate base tapering to the hyaline and often long acumen, not striate; inner cells irregular, oval or angulate, sometimes sinuous; inner basal cells subrectangular. Capsule piriform, short-necked; pedicel long. — Rocks r. *Amer.* Pacific district. Canada: Macoun. U. S.: Henderson, com. Cardot.

2. **Leucodon** Schwægrichen.

A. Pedicel of the capsule long-exserted. Leaves gen. entire and not distinctly decurrent.

1. **L. sciuroides** L. — Hypnum L.; Leucodon Schwægr. Leaves ovate-oblong or broadly ovate-lanceolate, short-acuminate and acute, plicate or striate, open when moist; upper cells oblong, the others narrow. Perichetial leaves short-acuminate. Capsule suboblong; teeth split; endostome indistinct; lid conic, acute. — On trees, less often on rocks. *Eur.* common. Sweden, Norway, Germany, Switzerland, Italy! *Amer.* r. Can.: Macoun.

* **L. morensis** Schwægrichen.
Leaves shorter, subovate, less striate; the perichetial longer acuminate. Capsule cylindric, slightly curved; endostome rudimentary; lid rostellate. — *Eur.*, southern districts, often frequent. Greece: Haussknecht. Italy: Arcangeli; E. Adlerz. France: Husnot. Spain: Dieck, com. Roell.

B. Pedicel of the capsule immersed or short-exserted. Leaves often denticulate or sinuolate at acumen, sometimes decurrent.

2. **L. brachypus** Bridel. — Sullivant icon. muscor. Leaves (as in *L. sciuroides*) ovate-oblong or broadly ovate-lanceolate, short-acuminate, more or less striate-plicate, decurrent; inner basal cells narrow. Capsule oval, partly immersed; teeth us. entire; lid rostrate. Branches often nearly simple. — Trees. *Amer.* U. S. not r.: Austin, com. Macoun; Canada? (sterile specimens): Macoun.

3. **L. julaceus** L.; Sull. l. c. — Hypnum L.; Leucodon Sull. Differs from the last: Leaves shorter, broad-ovate with very short acumen, not striate, less decurrent, nearly spreading when moist. Capsule round-oval; teeth slightly split above; pedicel sometimes exserted, often curved or flexuous. Branches ramose. — Trees. *Amer.* U, S., northeastern slope: Sullivant, com. C. Mueller; Fitzgerald etc., com. Renauld and Cardot.

3. **Forsstræmia** Lindberg.

A. Leaves entire or faintly sinuolate above; cells pellucid. Peristome whitish.

1. **F. trichomitria** Hedw. — Pterigynandrum H.; Forsstrœmia Lindb.; Leptodon Mohr; Sulliv. ic. musc.

Leaves gen. ovate-oblong, short-acuminate, often faintly striate, sinuolate at acumen; middle cells oblong-lanceolate; costa indistinct. Capsule oblong or subcylindric, exserted; lid rostrate; pedicel not or partly exserted. — On trees, r. on rocks. *Amer.* Can.: Macoun. U. S.: Sullivant, com. C. Mueller; Austin, com. Macoun.

2. **F. immersa** Mohr. — Leptodon Mohr; Forsstrœmia Kindb.

Differs from the last: Branches shorter; leaves subovate; capsule smaller, oval and nearly immersed. — *Amer.* U. S. r.: Sullivant, com. C. Mueller.

3. **F. floridana** Lindb. — Leptodon Lindb.; Forsstrœmia Kindb.

Differs from *F. trichomitria:* »Leaves broader, ovate, abruptly acuminate; cells larger and broader; capsule half as large; pedicel longer, not diverging from the stem»: Lindb. — *Amer.* r. »U. S.»: Lindberg (not seen).

4. **F. ohioënsis** Lindb. — Leptodon Sull. icon. musc.

Leaves broad-ovate, abruptly narrowed to a very short, faintly sinuolate acumen, not striate; middle cells oval-oblong; costa thick. Capsule suboval, exserted; lid short-apiculate; pedicel partly emergent. — Trees. *Amer.* U. S. r.: Sullivant, com. C. M.

B. Leaves (at least the younger ones) denticulate above; cells very chlorophyllose, not pellucid. Capsule red-mouthed; teeth brown or red.

5. **F. nitida** Lindb. — Leptodon Sull. l. c.

Leaves ovate or broadly ovate-oblong, short-acuminate acute, faintly or not striate; middle cells suboblong, the alar ones often more dilated; costa very short or vanishing near the middle. Capsule suboval or subglobose, immersed or partly emergent; teeth pale brown; lid apiculate. — Trees. r. *Amer.* Canada: Macoun.

6. **F. Ravenelii** Austin. — Cryphæa Aust.; Forsstrœmia Kindb.

»Leaves round-ovate obtuse; areolation uniform; costa reaching above the middle. Capsule oval, immersed; teeth red; lid acute»: Lesq. et Jam. — *Amer.* »U. S. r.: Ravenel»: Lesq. et Jam.

4. Cryphæa Mohr.

A. Leaves entire; costa abbreviate.

a. Leaves small; the inner perichetial truncate or obtuse.

1. **C. glomerata** Br. eur.; Sulliv. icon. musc.

Leaves ovate, subacute, sometimes short-acuminate, nearly spreading when moist; upper cells narrow, the middle suboval; costa reaching to the middle or shorter. Perichetial leaves suboblong; costa broad, long-excurrent. Capsule ovate-oblong; teeth whitish, much surpassing the endostomial segments; calyptra cucullate, scabrous at apex. — Trees r. *Amer.* U. S.: com. Cardot.

2. **C. pendula** Lesquereux et James.

Differs from the last: Leaves broad-ovate; upper cells rhombic-oval, the inner basal linear; costa often reaching above the middle. Perichetial leaves broader, suboval, the outer acuminate with abbreviate costa, the inner ones obtuse with long-excurrent costa. »Lid of the capsule conic obtuse; calyptra conic, entire, hispid to below the middle. Branchlets sometimes filiform and flagellate»: Lesq. et Jam. man. — Trees (on Tillandsia); *Amer.* U. S. r.: Ravenel, herb. James, com. C. Mueller.

b. Leaves somewhat large, the perichetial acuminate or acute.

3. **C. arborea** Hudson. — Sphagnum Huds.; Cryphæa Lindberg.

Leaves ovate or ovate-oblong, gen. acute, sometimes short-acuminate, recurved, patent when moist; upper cells rhombic, the basal (at the insertion) orange; costa reaching above the middle. Perichetial leaves narrower, entire; costa gen. long-excurrent. Capsule oblong, red-mouthed; teeth yellow below, pale above; endostomial segments nearly as high; lid rostellate; calyptra mitriform, scabrous. — On trees, r. on rocks. *Eur.* England: Rogers. France: Le Jolis; Berthoumieu. Italy: Arcangeli.

4. **C. Lamyi** Montagne; Husnot; Kindb. revue bryol. 1895.

Differs from the last: Leaves broad-ovate, subobtuse, slightly recurved; lower basal cells hyaline. Perichetial leaves denticulate. Capsule shorter, oval; lid apiculate; calyptra cucullate. — Inundated rocks and trees r. *Eur.* Portugal: I. Newton, com. Brotherus.

B. Leaves sinuolate at acumen; costa subpercurrent but not excurrent (also in the perichetial leaves).

5. **C. nervosa** Hooker et Wilson; Sull. ic. musc.

Leaves small, from ovate-oblong base acuminate; upper cells narrow, the middle suboval. Perichetial leaves narrower, longer acuminate, serrulate above. Capsule ovate; lid conic obtuse; teeth whitish, much surpassing the endostomial segments; calyptra cucullate, scabrous at apex. — Trees r.; *Amer.* U. S.: com. Cardot.

5. **Antitrichia** Bridel.

A. Upper leaf-cells narrow. Pedicel of capsule elongate.

1. **A. curtipendula** L. — Hypnum L.; Antitrichia Brid. Leaves striate, from ovate base abruptly acuminate or ovate-lanceolate, narrowly reflexed to the denticulate acumen; nerves 3, the median reaching into acumen. Perichetial leaves serrulate at acumen. Capsule oblong; lid apiculate; pedicel curved or flexuous. Perigonial leaves very short. Stem pinnate. — Rocks and trees. *Eur.* gen. common, Sweden, Switzerl.! *Amer.* r. Can.: Macoun.

2. **A. gigantea** (Sull. et Lq. as var.) Kindb. rev. bryol. 1895. Leaves larger, not striate, broadly ovate-lanceolate, broadly recurved to the nearly entire or minutely denticulate acumen; nerves gen. 5, the median vanishing far below acumen. Perichetial leaves entire. Capsule oblong-cylindric; pedicel straight. — *Amer.* not r. in Pacif. distr. Alaska: J. M. Macoun. Can.: J. Macoun. U. S. Oregon: J. A. Hertzman, com. E. Nyman.

3. **A. tenella** Kindb. bull. Torr. club XVII. Differs from *A. curtipendula*: Leaves smaller, not striate, ovate acute, recurved all around, denticulate at apex; cells gen. shorter; median nerve more abbreviate. Perigonial leaves longer. Stem irregularly divided with numerous very short branches. Only male plants found. — Rocks r. *Amer.* Can. Pacif. distr.: Macoun.

B. Upper leaf-cells oval-oblong. Pedicel short-emergent.

4. **A. pseudo-californica** Kindb. check-list of Eur. and N. Amer. mosses. — Neckera californica Hooker et Arnott; Alsia Sull. Leaves ovate obtuse or short-acuminate acute, not striate, nearly entire; nerves 3, the median reaching gen. to middle. Perichetial leaves long-acuminate. Capsule cylindric-oval; lid rostrate; pedicel straight. Stem pinnate with very short branches. — *Amer.* Pacif. distr. U. S.: Miss Mann, com. Cardot.

Fam. 2. **Anomodontaceæ.**

6. **Anomodon** Hooker et Taylor.

I. **Eu-Anomodon.** Leaves distinctly papillose, r. recurved, not r. large, often crisped when dry. Secondary stems often erect.

II. **Leskeella.** Leaves nearly smooth, small, us. recurved, gen. appressed when dry. Stem us. creeping.

I. Eu-Anomodon.

A. Leaves large very broad at base, not subulate, crisped; borders undulate not recurved; inner basal cells sublinear pellucid, other cells rotundate-quadrate opake. Branches thick uniform irregularly divided, not flagelliferous.

1.**A.viticulosus** L. — Hypnum L.; Anomodon Hook. et T.

Leaves from ovate base tapering to an obtuse or subacute acumen, quite entire. Perichetial leaves with narrower, acute or subfiliform acumen. Capsule large subcylindric; teeth twice longer than endostome; lid rostellate; pedicel yellow. — Stone and trees. *Eur.* nearly common. Sweden, Norway, Germany, Switzerl., Italy! *Amer.* r. Can.: Macoun.

2.**A.apiculatus** Br. eur.; Sull. ic. m. — Hypnum Rugelii C. M.

Leaves from broad-ovate or cordate subfimbriate base abruptly contracted to a narrow sublinear obtuse or apiculate acumen. Perichetial leaves with sublinear obtuse acumen. Capsule large subcylindric; segments very short or rudimentary; lid apiculate; pedicel red. — Rocks and trees r. *Eur.* Sweden 1859! Norway 1862! *Amer.* Can.: Macoun.

3.**A.platyphyllus** Kindb. note on Can. bryol. 1893.

Leaves short very broad, ovate or ovate-oblong or from cordate strongly papillose base slightly contracted to a lingulate blunt acumen. Perichetial leaves with subdentate strongly papillose base and narrow lingulate acumen. Capsule small oval-oblong; segments rudimentary; lid short-conic not apiculate; pedicel yellow very much shorter than in the last. — Trees r. *Amer.* Can.: Macoun.

B. Leaves gen. small and appressed or suberect when dry. Branches not thick.

a. Leaves very broad at base, not subulate-acuminate.

4.**A.minor** Beauvois. — Neckera B.; Anomodon Fuernrohr; A. obtusifolius Bruch et Sch.; Sull. ic. m.

Leaves from subovate base abruptly tapering to a linear-lingulate acumen, subdistichous when moist; borders entire undulate not recurved; cells round-quadrate opake except the few sublinear at base. Perichetial leaves with narrow lingulate acumen. Capsule small suboval; segments short or rudimentary; lid rostrate or rostellate; pedicel yellow not long. Plants glaucous green. — Trees. *Amer.* Can. r.: Macoun. U. S.: Sullivant, com. C. Mueller; com. Roell and Cardot.

5.**A.attenuatus** Schreber. — Hypnum Schreb.; Anomodon Huebener.

Leaves from subovate base abruptly tapering to a shorter, gen. subacute denticulate acumen; borders not recurved; cells as in the last. Perichetial leaves with sublinear-subulate acumen. Capsule small cylindric; segments often long; lid rostrate; pedicel red. Branches long not compressed, often curved when dry; branchlets often flagellate, their leaves narrow often subulate. Tufts intricate. R. fruiting. — Rocks and trees not uncommon. *Eur.* Sweden, France, Switzerl., Italy! *Amer.* Can.: Macoun. U. S.: Purpus, com. Roell.

6.**A.californicus** Lesquereux.

»Leaves broadly ovate acute, very papillose and fimbriate at the auricled base, decurrent; borders recurved; upper cells ovate-quadrate. Capsules unknown. — *Amer.* U. S.»: Lesq. et Jam.

b. Leaves subulate-acuminate entire. Tufts intricate. Branchlets often flagelliform.

7.**A.longifolius** Schleicher; Pterogonium Schl.; Anomodon Bruch.

Leaves ovate-lanceolate gradually acuminate, long-decurrent, not recurved; cells round-quadrate; costa subpercurrent. Capsule cylindric; teeth twice longer than endostome; lid apiculate. Tufts pale green. Very r. fruiting. — Rocks and trees below alps gen. r. *Eur.* Sweden not r., Switzerl.!

8.**A.rostratus** Hedwig. — Leskea H.; Anomodon Schimper.

Leaves from subovate base abruptly acuminate often with hyaline hairpoint; borders recurved gen. to acumen; cells as in the last; costa reaching to acumen or shorter. Capsule oval-oblong; teeth about twice longer than endostome; lid rostrate or rostellate. Tufts us. pale green above and rusty red below, r. wholly dark green. — Rocks and trees. *Eur.* r. Switzerl.! *Amer.* not r. Can.: Macoun; Waghorne. U. S.: Roell; Sullivant, com. C. Mueller.

II. Leskeella Limpricht, in part.

A. Costa of leaves short, in the perichetial obsolete.

9.**A.tectorum** Al. Braun. — Pterogonium Braun; Anomodon Kindb.; Pseudoleskea Schimper.

Leaves with ovate base and gen. short (sometimes long falcate) acumen, acute, recurved below; middle cells oval-oblong; costa vanishing far below acumen, sometimes forking. Capsule cylindric; teeth yellow; segments long without basal membrane; lid rostellate; pedicel short. Stem pinnate creeping, julaceous when dry. Leaves sometimes smaller than in *A. nervosus.* Very r. fruiting. — On roofs and rocks, r. on walls or trees, gen. r. *Eur.* Norway! Germany: Roell. *Amer.* »Greenl.»: Berggren.

10.**A.subrigidulus** Kindb. n. sp.

Differs from the last: Leaves more distinctly recurved to the short acumen; middle cells round-oval; costa gen. reaching to acumen. Stem irregularly divided not creeping. Capsule and lid as in the last; peristome not seen. — Rocks r. *Amer.* Can. Labrador: Waghorne.

B. Costa of leaves long, also in the perichetial.

11. **A. nervosus** Bridel. — Pterigynandrum Brid.; Anomodon Huebener; Leskea Myrin.

Leaves from short subovate base abruptly tapering to a long subulate filiform-pointed acumen, recurved to it; middle cells round-oval; costa subpercurrent or long-excurrent. Perichetial leaves entire long-acuminate. Capsule oblong cylindric; teeth orange; segments short or rudimentary with indistinct basal membrane; lid rostellate; pedicel short. Stem creeping; branches pinnate subjulaceous. R. fruiting. — Rocks and trees. *Eur.* not r. Sweden, Norway, Switzerl.! *Amer.* r. Can. less r: Macoun; Waghorne.

12. **A. heteroideus** C. M. et Kindb. catal. Canadian musci.

Leaves gradually acuminate without filiform point, not recurved to acumen; middle cells roundish; costa not percurrent, shorter and fainter than in the last. Perichetial leaves denticulate or sinuolate. Capsules unknown. Branches not distinctly julaceous; branchlets flagelliform with very small nerveless leaves. — Rocks and trees r. *Amer.* Can.: Macoun; Waghorne.

13. **A. Moseri** Kindb. — Leskea note on Can. bryol. 1893.

Leaves as in *A. nervosus* but smaller; cells more rotundate. Perichetial leaves narrowly ovate-oblong, obtusate or short-acuminate, denticulate at least above middle. Capsule lanceolate-cylindric small-mouthed; teeth pale; segments as high with distinct basal membrane; lid apiculate; pedicel twice longer than in *A. nervosus.* — On earth r. *Eur.* Can.: J. Moser, com. Macoun.

14. **A. rupestris** Berggren. — Leskea Bgr.; Anomodon Kindb.; »Leskea nervosa»; Milde and Limpricht.

Leaves smaller than in *A. nervosus*, narrowly ovate-oblong or ovate-lanceolate, shorter acuminate, not recurved; cells oblong; costa not much prolonged into acumen. Tufts brownish or olivaceous. Capsules unknown. — Rocks in alp. region r. *Eur.* Norway!

15. **A. rigidulus** Kindb. Laubm. Schw. u. Norw. — »Leskea nervosa»: Limpricht.

Leaves much shorter than in *A. nervosus*, broadly recurved all around; middle cells rotundate; costa percurrent. Stem-leaves round-ovate obtuse; branch-leaves ovate-oblong gen. obtusate acute, r. short-acuminate. Stem irregularly divided not creeping; branches quite julaceous. Capsules unknown. — Rocks in alp. region r. *Eur.* Norway near Kongswold!

7. **Lindbergia** Kindberg, new genus.

1.**L.brachyptera** Mitten. — Pterogonium Mitt.

Leaves from broad-oval base contracted to a subulate acumen, slightly reflexed below, faintly denticulate only at acumen, strongly papillose, subclaviculiform (as in *Heterocladium*) and spreading when moist, nearly appressed when dry; upper cells rotundate, middle suboval, angular very numerous; costa reaching above middle. Capsule erect suboblong pale; teeth short yellow, connate at base; lid conic; pedicel yellow-red. — Old logs r. *Amer.* Can. Ontario: Macoun.

Fam. 3. **Fabroniaceæ.**

8. **Fabronia** Raddi.

A. Leaves dentate-ciliate or fimbriate; upper and middle cells oval-oblong; costa short or indistinct. Capsule with low convex often mamillate lid. Calyptra us. broad.

1.**F.octoblepharis** Schleicher. — Pterogonium Schl.; Fabronia Schwægrichen.

Leaves gen. ovate-oblong and not fimbriate with subulate-filiform point; costa often distinct. Perichetial leaves serrate above. Capsule obovate or suboblong; teeth brownish us. connate in pairs; calyptra broad. — Rocks and stonewalls. *Eur.* south. distr. somewhat r. Switzerl.! *Amer.* r. »U. S.»: Lq. et Jam.

***F.pusilla** Raddi.

Leaves us. narrower, gen. ovate-lanceolate fimbriate with longer and filiform hyaline point; costa often indistinct. Perichetial leaves sharply serrate also below. Capsule often subglobose; teeth yellowish often finally free. — Princ. on trees, r. on rocks. *Eur.* not r. in south. distr. Italy! *Amer.* r. Can.: Macoun.

2.**F.gymnostoma** Sullivant et Lesquereux; Sull. ic. m.

Leaves gen. costate and ciliate; perichetial irregularly dentate. Capsule obovate; peristome wanting; calyptra narrow. Not much differing from *F. octoblepharis* in barren state. — *Amer.* r. U. S.: Wright, com. C. Mueller; Fendler, com. Renauld.

B. Leaves serrulate with small not ciliiform teeth; upper and middle cells narrow; costa us. distinct.

a. Leaves short-costate. Capsule with conic lid; calyptra narrow.

3.**F.Wrightii** Sullivant icon. muscor.

Leaves ovate-lanceolate gradually tapering to an often long filiform point. Perichetial leaves denticulate all around. Capsule piriform; teeth orange gen. not connate. Branches somewhat thicker than in *F. octoblepharis.* — *Amer.* r. U. S.: Wright, com. C. Mueller.

4.**F.Ravenelii** Sullivant icon. muscor.

Leaves ovate-oblong, broader than in the last with smaller teeth and less gradually tapering to the often short point. Perichetial leaves entire below, faintly serrulate above. Capsule subcylindric or narrowly piriform; teeth brownish not connate. Branches thickish often curved and subjulaceous when dry. Habit of *Pterygynandrum.* — Logs r. *Amer.* Can.: Macoun. U. S.: Fitzgerald, com. Cardot.

b. Leaves long-costate. Stem with flagelliform shoots. Capsules unknown.

5.**F.Sendtneri** Schimper.

»Leaves ovate-lanceolate; costa vanishing below acumen»: Limpricht. — Rotten logs r. *Eur.* »Istria: Sendtner»: Schimper.

9. **Clasmatodon** Hooker et Wilson.

1.**C.parvulus** Hampe. — Leskea Hampe; Clasmatodon Sulliv. ic. musc.; Anisodon Bertrami Schimper.

Leaves ovate acute sometimes short-acuminate, minutely serrulate above middle; upper cells oblong, lower inner oblong-lanceolate; costa reaching to middle. Perichetial leaves abruptly narrowed to a long sublinear denticulate acumen. Capsule oval-oblong; teeth yellow; lid conic; pedicel more or less elongate. — Trees. *Amer.* U. S. less r.: com. Macoun, Levier and Cardot. *Eur.* »Germany: Bertram»: C. M.

2.**C.rupestris** (Sull. et Lq. as var.) Kindb. rev. bryol. 1895.

Leaves broad-ovate obtuse entire; upper cells rhombic-oval, lower suboblong; costa vanishing below middle. Perichetial leaves gradually narrowed to the entire acumen. Capsule round-oval; teeth orange; lid low convex; pedicel short. — Rocks r. *Amer.* U. S.: com. Macoun.

10. **Habrodon** Schimper.

1.**H.perpusillus** Notaris. — Pterogonium Not.; Habrodon Lindb.

Leaves ovate-oblong acute short-acuminate with gen. short filiform point, entire or at acumen faintly sinuolate; upper cells rhombic, middle oval-oblong, lower inner oblong-lanceolate. Capsule oblong-cylindric; teeth hyaline distant without basal membrane; lid conic. Very r. fruiting. — Trees r. *Eur.* Italy, Switzerl.! *Amer.* »U. S.»; Sulliv.

11. **Anacamptodon** Bridel.

1.**A.splachnoides** Froehlich. — Orthotrichum Fr.; Anacamptodon Brid.

Leaves entire ovate-oblong short-subulate; inner cells suboblong; costa vanishing near middle. Capsule suboblong or oval with short neck; teeth dark purplish united in pairs, much longer than segments; lid rostellate; pedicel long thick reddish. Monoecious. -- Rotten branches of trees r. *Eur.* France: Schimper; Husnot; Berthoumieu. *Amer.* »U. S.»: C. M.

Fam. 4. **Pterobryaceæ.**

(Endotrichaceæ Kindb. in »Genera of Eur. and N. Amer. Bryineæ».)

12. **Pterobryum** Hornschuch.

1.**P.cymbifolium** Sullivant. — Pilotrichum Sull. ic. m.; Pterobryum Mitten.

Leaves concave from ovate-oblong base gradually short-acuminate, not recurved; lower basal cells orange, alar very numerous; costa reaching to acumen. Perichetial leaves nerveless. Stem subpinnate above; branches turgid julaceous. Capsules unknown. — *Amer.* r. U. S. Florida: Sullivant, com. C. Mueller.

2.**P.Ludoviciæ** C. Mueller. — Neckera C. M.; Pterobryum Kindb.

Differs from the last: Leaves longer-acuminate abruptly narrowed; alar cells less numerous; costa percurrent or vanishing in acumen. Perichetial leaves with long-excurrent costa. Capsule exserted; pedicel short; peristome not seen. — Trees r. *Amer.* U. S.: com. Macoun and Cardot.

Fam. 5. **Neckeraceæ.**

13. **Neckera** Hedwig.

A. Capsule not annulate Stem us. pinnate.

a. Leaves with long sharply dentate-spinulose acumen; upper cells narrow; costa short double or indistinct.

I. **Douglasiella.** Leaves us. undulate. Capsule more or less emergent; endostome as high as teeth. Dioecious.

b. Leaves obtusate or short-acuminate, not or faintly denticulate; upper cells gen. wide.

aa. Leaves with long simple costa. Endostomial segments long. Paraphyllia us. numerous.

II. **Menziesiella.** Leaves undulate. Capsule immersed. Dioecious.

bb. Leaves with short double or indistinct costa. Endostomial segments short or rudimentary. Paraphyllia few or wanting.

III. **Eu-Neckera.** Leaves undulate sublinear-ovate; middle and lower cells gen. narrow. Capsule often immersed. Often monoecious.

IV. **Leiophyllum.** Leaves not undulate often short; middle cells sometimes wide. Capsule gen. long-exserted. Branches often flagelliferous. Dioecious.

B. Capsule annulate. Stem not distinctly pinnate.

V. **Homalia.** Leaves not undulate; costa sometimes simple but abbreviate. Capsule long-exserted. Branches not flagelliferous. Monoecious or dioecious.

I. Douglasiella Kindb.

1.**N.Douglasii** Hooker.

Leaves large undulate with cordate base, sublinear-lanceolate broad acuminate, faintly denticulate below acumen sometimes to middle, entire in lower part, only at angles sinuolate; teeth of acumen sometimes hooked; cells gen. fusiform-linear orange at insertion, alar short wide. Perichetial leaves filiform-pointed. Capsule red oval-oblong; pedicel us. triply longer; teeth pale yellow. Plants pale green, finally becoming whitish. Stem very long; flagellæ often longish. Trees and rocks. *Amer.* Pacif. distr. Can.: Macoun. U. S.: Bolænder, herb. Lesquereux, com. Renauld.

2.**N.cephalonica** Juratzka; Kindb. rev. bryol. 1895.

Leaves small not undulate and not distinctly cordate, from broader and entire basal part gradually tapering to the long subulate often filiform-pointed acumen; its teeth not hooked; cells narrow sublinear at insertion yellowish, alar not distinct. Stem short. Capsules unknown. Dioecious. — *Eur.* r. »Greece: Unger»: Juratzka. (*Africa*, Madeira: Liebetrut, com. C. Mueller.)

II. Menziesiella Kindb.

A. Capsule immersed longer than pedicel; segments as high as teeth or higher. Leaves finally brown.

3.**N.Menziesii** Hooker; Sullivant icon. musc.

Leaves sublinear broader below, faintly denticulate above middle; apical and alar cells dilated, the others narrow. Capsule suboval; teeth orange. Branches us. distant with numerous flagellæ. Stem often very long. — Rocks and trees. *Amer.* Pacif. distr. not r. Can.: Macoun. U. S.: Roell; Mrs L. C. Feely; Henderson, com. Cardot.

***N.amblyclada** Kindb. (cat. Can. m., as var.).

Branches crowded obtuse r. and sparingly flagellate. Leaves suboblong shorter; cells dilated, upper subrhombic, lower oblong, inner basal narrow. Capsules unknown. — Rocks r. *Amer.* Can. Pacif. distr. in subalp. region: Macoun.

4.**N.turgida** Juratzka.

Leaves sublinear-oblong sometimes denticulate to below middle; apical and alar cells dilated, the others narrow. Branches us. crowded obtuse; flagellæ few and short. »Capsule oblong-cylindric; teeth yellowish brown»: Limpricht. — Rocks and trees r. *Eur.* Germany: Geheeb.

***N.jurassica** Amann; Limpricht.

»Leaves subsecund; cells gen. subrhombic. Capsules unknown. — Rocks r. *Eur.* Switzerl.: Amann»: Limpricht.

B. Capsule partly emergent above perichetial leaves, not longer than pedicel; segments unknown. Leaves us. yellowish green.

5.**N.mediterranea** Philibert.

Leaves subovate-oblong gen. nearly entire; inner lower cells narrow, the others dilated. Capsule suboval; teeth pale yellow. Branches often distant; flagellæ short. — Rocks r. *Eur.* France: Philibert; Payot, com. Husnot.

III. Eu-Neckera.

A. Pedicel of capsule long-exserted. Leaves large strongly undulate us. shining and finally becoming brown. Dioecious.

6.**N.crispa** L. — Hypnum L.; Neckera Hedwig.

Leaves gen. sublinear obtusate; perichetial long-sheathing short-pointed. Capsule oval; segments distinct, basal membrane obsolete. Branches sometimes turgid and less distinctly pinnate. — Rocks princ. not shaded. *Eur.* not r. Sweden, Switzerl.!

B. Capsule wholly immersed. Leaves large strongly undulate green not glossy. Monoecious.

7.**N.pennata** L. — Fontinalis L.; Neckera Hedwig.

Leaves gen. sublinear obtusate, those of younger branches us. longer-acuminate with narrower apical cells; perichetial gradually acuminate long-pointed. Capsule oval; endostome rudimentary. Stem rigid. — Us. on trees r. on shaded rocks in woods, somewhat r. *Eur.* Switzerl.! *Amer.* Can.: Macoun; Moser; Waghorne.

C. Capsule with shortly or not exserted pedicel. Leaves less large not strongly undulate us. green; apical cells short.

a. Dioecious r. fruiting. Capsule with emergent pedicel; endostomial segments distinct. Leaves somewhat small.

8.**N.pumila** Hedwig.

Leaves sublinear-oblong gen. acute, more or less acuminate or filiform-pointed, slightly undulate, often recurved below at one side and inflexed at the other. Capsule oblong; teeth pale yellow; basal membrane of endostome distinct. Often with propagula. — On trees r. on rocks, princ. below alp. regions. *Eur.* Switzerl.! *Amer.* »U. S.»: Cardot.

b. Monoecious not r. fruiting. Capsule partly emergent; endostome rudimentary.

9.N.oligocarpa Bruch.

Leaves gen. sublinear-oblong short-acuminate; costa very short. Perichetial leaves gradually acuminate. Capsule round-oval; teeth pale yellow. Stem not rigid; branches us. pinnate. — On rocks r. (in Amer.) on trees, princ. in alp. regions, r. *Eur.* Sweden, Norway! *Amer.* Can.: Macoun.

10.**N.pterantha** C. M. et Kindb. cat. Can m. (as subspecies).

Leaves as in the last but larger, often brown-green; costa longer. Perichetial leaves abruptly short-acuminate. Capsule round-oval; teeth white hyaline; antheridia and archegonia more numerous than in the last. Branches rigid, gen. simple and very long. — Rocks r. *Amer.* Can. Rocky mts: Macoun.

IV. Leiophyllum C. Mueller syn. musc.

A. Leaves obovate arrounded at apex.

11.**N.Besseri** Lobarzewski. — Omalia Lob.; Neckera Juratzka.

Leaves small denticulate above, often shining; cells dilated, middle and lower suboval. Perichetial leaves gradually acuminate. »Capsule oval subemergent; endostome incomplete with indistinct basal membrane»: Limpricht. — On rocks, r. on trees, r. *Eur.* Norway, Switzerl.!

B. Leaves not arrounded at apex, gen. somewhat narrow.

a. Leaves narrow-oblong or sublanceolate. Capsule long-exserted oval-oblong; segments and basal membrane distinct.

12.**N.complanata** L. — Hypnum L.; Neckera Huebener.

Leaves short-acuminate acute, minutely denticulate in upper third; middle and lower cells linear-lanceolate, alar subquadrate. Outer perichetial leaves abruptly acuminate. — On trees, less often on rocks. *Eur.* common. Sweden etc.! *Amer.* r. Can.: Waghorne.

b. Leaves (at least the upper) short and gen. obtusate, smaller than in the last. Capsules unknown.

13.**N.gracilis** James. — Homalia Jam.; Sull. ic. m.; Neckera Kindb.

Leaves oval-oblong indistinctly denticulate all around; middle cells rhombic, lower subrectangular-linear, alar subquadrate. — Rocks r. *Amer.* U. S.: Peck, com. Macoun.

14.**N.tenella** Kindb. Laubm. Schwed. u. Norweg.

Leaves gen. broad-oval, upper denticulate nearly all around; middle and lower cells oblong, lowest basal shorter and yellow. — Rocks in lower subalp. districts r. *Eur.* Norway in Gudbrandsdal! Sweden in Medelpad: M. Huss.

V. Homalia Bridel, as genus.

A Leaves dentate subfimbriate at apex, denticulate below; costa reaching above middle. Capsules unknown.

15.**N.lusitanica** Schimper. — Homalia Sch.; Neckera Kindb.

Leaves obovate subobtuse shining; only a single apical tooth prominent. — Rocks r. trees, r. *Eur.* Mediterr. distr. France: Boulay and Espagne, com. Husnot. Italy: Bottini; Arcangeli. Portugal: Levier.

B. Leaves denticulate near apex, nearly entire below; costa vanishing near middle, sometimes shorter and double.

16.**N.trichomanoides** Schreber. — Hypnum Schreb.; Neckera Hartman.

Leaves subacute or obtuse (sometimes subacuminate) with several prominent apical teeth, us. subobovate or spathulate, shining when dry. Inner perichetial leaves with patent subulate acumen. Capsule ovate-oblong; segments entire or rimose; beak of lid nearly as long as capsule. Monoecious us. fruiting. — Trees, stones and earth. *Eur.* gen. common. Sweden, Norway, Germany! »*Amer.*»: Lesq. et Jam.

17.**N.Jamesii** Schimper. — Homalia Sch.; Neckera Kindb.

Leaves minutely denticulate all around or nearly entire, neither apiculate nor acuminate, otherwise as in the last. »Capsule with shorter peristome; lid shorter rostellate»: Schimp. syn. R. fruiting. — Rocks r. *Amer.* Can.: Macoun; Waghorne. U. S.: James, com. C. Mueller.

18.**N.Macounii** C. M. et Kindb. — Homalia cat. Can. m.; Neckera Kindb.; Homalia obtusata Lesq. et Jam., non Mitten.

Leaves arrounded at apex, denticulate to middle, gen. lingulate and faintly or not glossy, finally yellow at insertion. Inner perichetial leaves suddenly narrowed to the erect sublinear obtuse acumen. Capsule suboblong; beak of lid much shorter; segments rimose. R. fruiting. Probably dioecious; male flowers not found. — Trees and rocks. *Amer.* Can.: Macoun; Moser; Waghorne.

14.Neckeropsis Reichardt (rather a subgenus of Neckera).

1.N.undulata Hedwig. — Neckera H.; Neckeropsis Reich.

Leaves undulate sublinear-lingulate with broader and cordate base, faintly denticulate all around; upper cells rhombic, middle and lower lanceolate-linear. Stem creeping. »Capsule immersed cylindric-oblong; teeth yellow; segments carinate as high; calyptra mitriform sparingly hairy»: C. M. syn. — Trees r. *Amer.* U. S.: Fitzgerald, com. Renauld. (Cuba: Wright, com. C. Mueller).

2.N.disticha Hedwig. — Neckera H.; Neckeropsis Kindb.

Leaves not undulate, sublingulate entire or above middle indistinctly denticulate; upper and middle cells rhombic-oval, basal and lower marginal linear. »Capsule subemergent oblong-cylindric; teeth pale; segments as high, split to base; calyptra conic dimidiate glabrous»: C. M. syn — Trees r. *Amer.* U. S.: Austin, com. Macoun.

15. **Porotrichum** Bridel.

1.P.Bigelowii Sullivant. — Hypnum Sull.; Porotrichum Kindb.

Leaves distant nearly plane, but involute at one side of base, obtusate acute sharply serrate above, sublinear-lanceolate or sublingulate; upper cells hexagonal-oval, middle oblong, lower sublinear; costa smooth long not percurrent, sometimes forking above. Capsule obovate; lid long-rostrate; pedicel curved above. Branches distant. Tufts bright green often glossy. — Wet rocks r. *Amer.* Pacif. distr. Can.: Macoun. U. S.: Mrs L. C. Feely; E. Hall, com. Macoun; com. Renauld and Cardot.

Fam. 6. **Leptodontaceæ.**

16. **Leptodon** Mohr.

1.L.abietinus Hooker. — Neckera Hook.; Leptodon Kindb.; Alsia Sulliv. ic. musc.; Leptodon circinnatus Sull.

Leaves serrulate gen. in upper third, mamillose-spinulose above at back and costa, more or less acuminate, acute or subobtuse at apex, gen. ovate-oblong or (those of stem) ovate-lanceolate, recurved below, often involute at acumen; cells very small and gen. oblong-linear, alar sometimes subquadrate; costa long not percurrent. Inner perichetial leaves convolute obtusate apiculate. Capsule red oval-oblong; teeth whitish; segments long rimose; calyptra and vaginula glabrous. Stem us. erect, sometimes bipinnate, its naked part us. long; branches crowded not flagelliferous; paraphyllia broad fimbriate. — Trees and rocks r. *Amer.* Pacif. distr. Can: Macoun. U. S.: Bolaender, com. C. Mueller; Miss Mann, com. Cardot; Mrs L. C. Feely; Hall, com. Macoun; Leiberg, com. Mrs Britton.

2.**L.Smithii** Dickson. — Hypnum Dicks.; Leptodon Mohr.

Leaves entire smooth obtuse oval-ovate recurved below middle; cells gen. rotundate, inner near costa sublinear, basal suboval; costa vanishing near or above middle Inner perichetial leaves long-acuminate. Capsule reddish yellow oblong; teeth pale; segments rudimentary or wanting; calyptra and vaginula hairy. Stem ascending or decumbent, its naked part short; branches distant often flagelliferous; paraphyllia sublinear. R. fruiting. — Trees and stones r. *Eur.* common in mediterr. distr. France: Le Jolis; Husnot. Italy: Arcangeli. Austria: Berggren. Engl.: Davies, com. W. H. Pearson.

17. Macouniella Kindb. in check-list of Eur. and N. Amer. mosses.

1.**M.californica** Sullivant. — Antitrichia Sull. ic. m.

Leaves not striate, with ovate-oblong base and denticulate shorter acumen; lower cells lanceolate-oblong; costa reaching to acumen. Perichetial leaves entire gradually narrowed to a filiform-pointed acumen. Capsule oblong-cylindric gen. long-exserted; teeth pale; segments short with distinct longitudinal line; lid rostrate. Stem pinnate suberect; branches julaceous. Dioecious. — Trees r. *Eur.* Mediterr. distr. France: Renauld, com. Gravet. *Amer.* Pacif. distr. Can.: Macoun. U. S.: Mrs Ames, com. Cardot.

Fam. 7. Meteoriaceæ.

18. Papillaria C. Mueller.

1.**P.nigrescens** Swartz. — Hypnum Sw.; Papillaria Sauerbeck et Jæger; Meteorium Mitt.; Lesq. et Jam.

Leaves entire from cordate base long-acuminate, ventricose in middle, faintly recurved below, involute-cucullate at apex, faintly papillose; cells minute, angular suboval seriate, inner basal sublanceolate; other cells oval-rhombic or rhomboidal. Stem thin subpinnate; branches with naked or at apex foliate flagellæ. »Capsule narrow-oblong; teeth white; lid rostellate»: C. M. Syn. »Endostome as in *Homalia*»: Lesq. et Jam. — Trees r. *Amer.* U. S.: Sawyer, com. Cardot.

*__P.Donnellii__ Kindb. n. subsp.; var. *Donnellii* Austin m. Apalach.

Stem and branches thicker. Leaves not distinctly papillose, abruptly short-acuminate. Capsules unknown. — *Amer.* r. U. S. Florida: Donnell Smith, com. Macoun.

19. Meteorium Bridel.

1.**M.pendulum** Sullivant icon. muscor.

Stem-leaves minute narrowly ovate-lanceolate long-acuminate filiform-pointed, minutely denticulate below, nearly entire above. decurrent, not or faintly recurved, papillose at back, patent when dry. Branch-leaves denticulate all around, sublinear or subulate-acuminate; costa faint reaching to acumen. Capsule minute suboval; pedicel about twice longer; teeth yellowish; segments nearly as high; lid apiculate. Stem long filiform subpinnate; branches flagellate very long. — Trees in subtropical distr. r. *Amer.* U. S.: Congdon, com. Macoun; Langlois, com. Cardot.

2.M.floridanum Austin. — Neckera Aust.; Meteorium (?) Kindb.

»Leaves concave cymbiform plicate obsoletely papillose, narrowly oblong-lanceolate, broadly revolute, entire or obsoletely serrulate; cells minute, the basal broader; costa vanishing above middle. Primary stem creeping with nerveless leaves; secondary stems somewhat compressed, pendent or erect. — Trees r. *Amer.* U. S.»: Lesq. et Jam.

Fam. 8. Hookeriaceæ.

20. Hookeria Taylor.

1.H.lætevirens Taylor. — Cyclodictyon Mitten.

Leaves elliptic-obovate obtusate filiform-pointed, slightly serrulate above; lower cells hexagonal-oval; nerves reaching above middle. Capsule oval inclined or pendent; teeth purplish; segments entire as high with high basal membrane; lid long-acuminate or rostellate. Monoecious. — Rocks near water r. *Eur.* Ireland: Holt and Stewart.

2.H.varians Sullivant; Lesq. et Jam.

Leaves suboblong acute sometimes short-acuminate, nearly entire; cells round-hexagonal twice larger than in the last; nerves reaching to middle. Capsule oblong horizontal or pendent, very small; teeth purplish; segments entire; lid short-acuminate. Polygamous. — *Amer.* r. »U. S.»: Lesq. et Jam. (Cuba: Wright, com. C. Mueller).

21. Callicostella C. Mueller.

1.C.cruceana Duby. — Hookeria Duby; Callicostella Sauerbeck et Jæger.

Leaves oblong-lingulate not limbate, not appressed when dry; upper cells papillose irregularly round-polygonal, lower short-rectangular. Capsule very small, oblong or ovate-cylindric; lid half as long; teeth dark purple, segments higher. Stem irregularly divided. Plants small. *Amer.* r. »U. S.»: Lesq. et Jam. (Mexico: Duby, herb. C. M.)

22. **Pterygophyllum** Bridel.

1.**P.lucens** L. — Hypnum L.; Pterygophyllum Brid.

Leaves plane very large, round-ovate or suboval, arrounded at apex, pale-hyaline when emarcid; upper cells round-hexagonal, lower oblong. Perichetial leaves ovate-lanceolate acuminate. Capsule suboval horizontal or deflexed; teeth orange; segments orange entire as high, their basal membrane high; lid rostrate; pedicel long red. Tufts loose. Stem irregularly divided. Monoecious. Habit of *Mnium punctatum*. — Wet places princ. near rivulets. *Eur*. France: Zetterstedt. Italy: Arcangeli. Austria: Schmidt Germany: Huebner Engl.: Cash; Holt. Norway: Ahnfeldt, com. S. Hardin. *Amer*. Pacif. distr. Alaska: J. M. Macoun. Can.: J. Macoun.

2.**P.Sullivantii** C. Mueller. — Hookeria Lq. et Jam.

Differs from the last: Leaves ovate or suboblong narrower and less large subacuminate subacute; cells oval-oblong nearly uniform. Capsules unknown. — Rocks r. *Amer*. U. S. Tennessee: Mrs Britton, com. C. Mueller.

23. **Daltonia** Hooker et Taylor.

1.**D.splachnoides** Smith. — Neckera Sm.; Daltonia H. T.

Leaves small entire from sublinear-lanceolate base tapering to a subsubulate shorter acumen; middle and lower inner cells oblong-lanceolate, marginal narrow-linear yellowish; costa reaching to acumen. Capsule small oval-oblong; teeth whitish or yellowish; segments entire as long without basal membrane; lid yellow rostrate; pedicel short. Plants small. — Rocks and trees r. *Eur*. Irel.: Holt; M'Ardle.

Fam. 9. **Leskeaceæ.**

24. **Thelia** Sullivant.

A. Leaves green fimbriate; their cilia not split.

1.**T.hirtella** Hedwig. — Pterigynandrum H.; Thelia Sull. ic. m.

Stem brown-tomentose; branches bilateral distant; paraphyllia numerous. Capsule subcylindric; teeth short; segments none; endostomial membrane elevate; lid rostrate; pedicel short. — Trees r. *Amer*. Can.: Macoun; Drummond n. 79; Lawson. U. S.: Roell; Sullivant, com. C. Mueller; com. Macoun and Cardot.

2.**T.robusta** Duby.

»Differs from the last: Branchlets unilateral very crowded. Leaves r. simply costate. Endostomial segments obtuse. — *Amer*. r. U. S.»: Lesq. et Jam.

3.**T.compacta** Kindb. in Ottawa Naturalist IV.

Stem brown-tomentose; branches unilateral crowded; paraphyllia none. Capsule suboblong; teeth short; segments none; endostomial membrane low; lid not rostrate; pedicel shorter than in *T. hirtella*. — Trees r. *Amer.* Can.: Macoun; Moser.

B. Leaves glaucous green; their cilia split Lid of capsule rostrate. Endostomial segments distinct; basal membrane elevate.

4.**T.asprella** Schimper. — Leskea Sch.; Thelia Sull. ic. m.

Stem brown-tomentose; branches short more or less distant, not unilateral; paraphyllia present. Leaves fimbriate with bifurcate cilia. Capsule cylindric-oblong; teeth long; pedicel not long. — Trees r. *Amer.* Can.: Macoun. U. S.: Roell; Austin, com. Macoun.

5.**T.Lescurii** Sullivant icon. muscor.

Stem not tomentose; branches unilateral elongate crowded or distant; paraphyllia none. Leaves not fimbriate, sometimes obtusate obtuse; cilia divided in 2, 3 or 4 lobes. Capsule cylindric; teeth not long; pedicel longer than in the last. — Sandy ground or rocks r. *Amer.* U. S.: Austin, com. Macoun.

25. **Pterygynandrum** Hedwig.

1.**P.filiforme** Timm. — Hypnum T.; Pterigynandrum Hedw.

Leaves recurved below, serrulate above, often striate, us. decurrent and not appressed; upper cells oblong, lower linear-lanceolate; costa reaching to middle or shorter. Stem-leaves recurved nearly all around, subovate or obovate, often short-acuminate. Branch-leaves ovate-oblong obtusate subobtuse us. very papillose. Capsule oblong-cylindric; teeth hyaline or yellowish; segments short. Stem us. denudate at base, in American variety creeping. — Trees and stones. *Eur.* common princ. in southern distr. Switzerl., Germany, Sweden, Norway! *Amer.* not common. Can.: Macoun; Waghorne.

***P. papillosulum** C. M. et Kindb. cat. Canad. m.

Differs in leaves neither striate nor decurrent, appressed when dry and not glossy; the younger subhyaline nearly smooth short-acuminate acute. Capsules unknown. — Rocks r. *Amer.* Can. Rocky mts: Macoun.

***P.decipiens** Weber et Mohr. — Neckera W. M.; Pterygynandrum Lindb.

Leaves indistinctly decurrent, not striate, gen. obtusate, appressed when dry and not glossy; those of stem less recurved. Branches thicker. Very r. fruiting. »Endostomial segments as high as teeth»: Limpricht. — Rocks princ. in colder distr. *Eur.* not r. Sweden, Norway, Switzerl.! *Amer.* r. Can.: Waghorne.

26. **Leskea** Hedwig.

A. Leaves nearly uniform, more or less recurved, smooth at borders at least below, more or less opake, often faintly papillose.

1.**L.polycarpa** Ehrhart.

Leaves faintly recurved near base, gen. acute short-decurrent not much distant; those of stem ovate-oblong, those of branches subovate. Perichetial leaves long-acuminate; costa thin. Capsule subcylindric often large; teeth pale yellow, segments nearly as high; lid conic acute often apiculate. Tufts often green. — Rocks and base of trees princ. on humid places. *Eur.* common below alp. regions. Sweden, Germany, Italy! *Amer.* not r. Can.: Macoun; Drummond n. 223. U. S.: Jesup, com. Macoun. Greenl.: Wenck, com. Roell.

***L.subobtusifolia** C. M. et Kindb. cat. Canad. m.

Branch-leaves very distant and decurrent gen. obtuse. Capsule not large; lid convex apiculate. — Base of trees r. *Amer.* Can.: Macoun. U. S. Ohio: Purpus, com. Roell.

2.**L.obscura** Hedwig; Sullivant icon. muscor.

Leaves recurved gen. all around, smaller than in the last, nearly crowded and not decurrent, subovate gen. obtusate obtuse. Perichetial leaves short-acuminate; costa thick. Capsule suboblong small; teeth pale; segments short; lid conic obtuse or subobtuse. Tufts us. dirty green. Branches shorter than in the last. — Base of trees near water r. *Amer.* U. S.: Sullivant, com. C. Mueller; Austin, com. Macoun; com. Renauld and Cardot.

B. Leaves very diversiform, not distinctly recurved, very papillose also at borders all around, opake.

3.**L.**(?)**Cardoti** Kindb. revue bryol. 1895. — »Leskea obscura Hedwig»: Cardot in litt.

Leaves nearly crowded; those of stem narrowly ovate-oblong acuminate acute; those of branches broad ovate gen. subobtuse apiculate. Capsule suboblong; peristome not seen. Habit of *Anomodon.* — *Amer.* r. U. S. Louisiana: Langlois, com. J. Cardot.

27. **Lescuræa** Bryol. eur.

A. Costa of leaves not excurrent. Uppermost branch-leaves r. mamillose above.

1.**L.striata** Schwægrichen. — Pterogonium Schw.: Lescuræa Br. eur.

Leaves oblong-lanceolate gradually acuminate recurved to the somewhat long acumen, slightly decurrent, us. entire; cells narrowly lanceolate-linear exc. the subquadrate alar and lower marginal. Apical cells of branch-leaves linear hyaline. Capsule small oval-oblong or subcylindric; teeth orange; segments brittle; basal membrane nearly indistinct; cilia none; lid conic acute. Branches straight. Tufts us. green not glossy. Habit of *Pseudoleskea.* — Trees princ. in southern distr. r. *Eur.* France: **Husnot. Italy: Bottini.**

***L.saxicola** (Br. eur., as var.) Molendo.

Leaves somewhat larger, gen. shorter-acuminate and denticulate near apex, us. yellowish and glossy. Branches often curved. Resembles *Pseudoleskea decipiens.* R. fruit. — Alp. rocks. *Eur.* not r. Norway fruit.!

2.**L.imperfecta** C. M. et Kindb. cat. Canad. m.

Differs from *L. striata*: Leaves from short subovate recurved base suddenly narrowed to a long subulate or filiform acumen, distinctly decurrent; upper and middle cells oval-oblong, inner near costa oblong-linear. Capsule oblong; endostomial membrane distinct; cilia short; lid subobtuse. — Earth and trees r. *Amer.* **Can. Brit. Col.: Macoun.**

B. Costa of some leaves long-excurrent. Upper branch-leaves often mamillose above.

3.**L.stenophylla** Renauld et Cardot. — Pseudoleskea Ren. et **Card.; Lescuræa Kindb.**

Leaves narrowly ovate-lanceolate gradually long-acuminate nearly entire, recurved below; upper cells suboblong, lower inner oblong-lanceolate. Capsule suboblong erect or finally inclined; teeth brownish; segments as high (very narrow); basal membrane very low. Tufts green or yellowish. — Rocks and trees r. *Amer.* Pacif. distr. Can. alp. region: **Macoun.** U. S.: **Roell, com. Cardot.**

4.**L.frigida** Kindb. n. sp.

Leaves from subovate base nearly gradually narrowed to the long subulate or filiform-pointed acumen, recurved to it and distinctly decurrent; cells sublinear except the quadrate alar; costa sometimes long-excurrent. Stem-leaves gen. entire; branch-leaves serrulate at the whole acumen, sometimes short-acuminate and faintly mamillose. Capsules unknown. Stem subpinnate. Tufts dark brown or blackish, not glossy. Very distinct in serrulate branch-leaves and very narrow leaf-cells. — *Amer.* r. Can. Northern Labrador: Macoun 1896.

28. **Myrinia** Schimper.

1.**M.pulvinata** Wahlenberg. — Leskea Wng; Myrinia Schimper; **Helicodontium Lindb.**

Leaves ovate acute not recurved, erect when dry; upper cells rhombic, lower oval-oblong, lowest basal subquadrate; costa vanishing below middle. Capsule small oval-oblong; teeth reddish; segments lower, orange, with longitudinal line and basal membrane; lid conic; pedicel short. Tufts dirty green. Branches distant not curved. Monoecious. Habit of *Leskea polycarpa* but with smaller leaves. — On base of trees, r. on rocks, princ. near rivers, r. *Eur*. Sweden 1853! Norway! *Amer*. Can.: Macoun.

2.**M.Dieckii** Renauld et Cardot.

Leaves gen. obtuse, sometimes recurved below, appressed when dry; cells rhomboidal or oval-oblong except the quadrate not well-defined alar; costa subpercurrent or somewhat shorter. Stem leaves ovate-oblong subacute; branch-leaves broad-ovate or suboval, sometimes indistinctly apiculate. Capsule (not ripe) subcylindric; lid not apiculate; pedicel short smooth. Branches distant not curved. Peristome and male flowers unknown. — Trees r. *Amer*. Pacif. distr. U. S.: Roell, com. Cardot.

29. **Helicodontium** Schwægrichen.

1.**H.subcapillatum** Hedwig. — Pterygynandrum H.; Helicodontium Kindb.; Homalothecium Schimp.; Sull. ic. m.

Leaves serrulate all around or above middle, not striate, recurved to acumen, very small and not appressed; alar cells hyaline, the others rhomboidal oblong or the inner basal sublinear; costa gen. simple vanishing near or above middle, sometimes shorter and double. Stem-leaves ovate abruptly narrowed to a long filiform or subulate point, decurrent; branch-leaves ovate-oblong gen. long-subulate. Perichetial leaves narrow long-acuminate. Capsule suboblong very small; teeth red, bordered at base (»sometimes also above»: Sull. l. c.) by the rudimentary endostome; lid rostellate; pedicel faintly rough, very short; calyptra sometimes beset with long hairs. Spores large. Branches erect subdistant not or faintly curved. Dioecious. — On bark r. *Amer*. U. S.: Sullivant, com. C. Mueller; Wolf, com. Macoun.

Fam. 10. **Entodontaceæ.**

30. **Holmgrenia** Lindberg (Orthothecium Schimper).

A. Tufts loose sparingly radiculose. Leaves more or less striate, reddish at insertion. Endostome not longer than teeth.

a. Leaves us. large and distinctly striate or plicate, recurved. Branches mostly long.

1.**H.chrysea** Schwægrichen. — Hypnum Schw.; Holmgrenia Lindb. 1862; Brachythecium lapponicum (Lindb.) Schimper.

Leaves ovate-oblong subobtuse or ovate-lanceolate acute or short-acuminate, abruptly contracted to a filiform point, us. suberect when dry. Capsule cylindric suberect; lid obtuse. Tufts golden glossy, r. greenish. Branches gen. simple. R. fruiting. — Wet rocks and swamps in alps r. *Eur.* princ. in northern districts. Norway! *Amer.* Can.: Macoun.

2.**H.rufescens** Dickson. — Hypnum D.; Holmgrenia Ldb.

Leaves ovate-lanceolate gradually long-subulate and filiform-pointed, patent also when dry. Capsule cylindric erect; lid obliquely rostellate Tufts us. copper-glossy, sometimes green. Branches often divided. Less r. fruiting. — Wet rocks princ. in alps. *Eur.* not r., often in southern distr. Norway, Switzerl.! *Amer.* »Can.»: Lesq. et Jam.

* **H.complanata** Kindb. — Orthothecium Kindb. Laubm. Schw. u. Norw.

Leaves less patent, smaller and shorter with shorter acumen and not long filiform point, faintly striate. Branches often complanate. Capsules unknown. — Alpine rocks r. *Eur.* Norway!; S. O. Lindberg and E. Nyman.

b. Leaves small, faintly or not striate, sometimes not recurved. Branches us. short.

3.**H.rubella** Mitten. — Stereodon Mitt.; Holmgrenia Kindb.; H. binervula Molendo.

Leaves ovate-oblong short-acuminate, abruptly contracted to a filiform point, us. recurved and faintly striate, more or less patent. Tufts copper-glossy or yellowish, r. olivaceous or green. Capsules unknown. — Rocks often in crevices and caverns princ. in alps, r. *Eur.* Norway!

* **H.stricta** Lorentz.

Leaves with shorter filiform point, less or indistinctly striate, us. not recurved, more appressed when dry. — *Eur.* r. Norway, Switzerl.! *Amer.* r. Can.: Macoun.

B. Tufts intricate radiculose. Leaves not striate, pale or yellowish at insertion. Endostome longer than teeth.

4.**H.irrorata** Sendtner. — Leskea Sendt. 1848; Holmgrenia Kindb.; Hypnum C. M. syn.; Leskea intricata Hartman 1849.

Leaves small ovate-lanceolate, gradually long-subulate with gen. filiform point, not recurved, patent and us. green and silky glossy when dry. Capsule oval-oblong suberect; lid conic. Stem divided; branches short often curved. Perichetial leaves denticulate above. Very r. fruiting. — Crevices and caverns of rocks princ. in alps, r. *Eur.* Norway, Switzerl.! *Amer.* Can.: Macoun.

31. **Entodon** C. Mueller (Cylindrothecium Schimper).

A. Leaves obtusate or short-acuminate, entire or near apex denticulate-sinuolate. Endostome not much lower than teeth.

a. Leaves entire with traces of several nerves near base. Stem pinnate eradiculose. Dioecious r. fruiting.

1.**E.orthocarpus** Dela Pylaie. — Hypnum Dela P.; Entodon Lindb.; Cylindrothecium concinnum (Not.) Schimp.

Leaves ovate obtuse subcucullate at apex, not large, at insertion yellow; alar cells small green. Capsule cylindric; teeth red-yellow; annulus narrow; lid not rostellate; pedicel long. Stem rigid pale; branches subdistant somewhat turgid. Tufts loose green or yellowish. Habit of *Hylocomium Schreberi*. — Dry earth and stone. *Eur.* not r. Norway! Switzerl.!; Schimper and Philibert (fruit. specim.). *Amer.* r. Can. N. Foundl.: Waghorne.

b. Leaves entire or near apex denticulate-sinuolate; costa double or indistinct. Stem irregularly divided or subpinnate, more or less radiculose. Monoecious often fruiting.

aa. Branches turgid julaceous. Leaves sometimes short-acuminate; costa often distinct.

2.**E.seductrix** Hedwig. — Neckera H.; Entodon C. M.; Cylindrothecium Sulliv. icon. musc.

Leaves oval-ovate acute sometimes with deflexed point, very concave but not cucullate, us. quite entire; cells often wider than in allied species, alar finally hyaline. Capsule cylindric; teeth orange distantly articulate; annulus more or less imperfect; lid rostrate; pedicel us. short. Perichetial leaves acute or short-apiculate. Tufts dense us. green. Branches crowded. — Trees and logs in moist places. *Amer.* not r. Can.: Macoun; Drummond n. 160a in part, com. Macoun. U. S.: Sullivant, com. C Mueller; Purpus, com. Roell; com. Renauld and Cardot.

3.**E.Sullivantii** C. Mueller. — Cylindrothecium Sull. ic. m.

Leaves suboblong short-acuminate less concave, us. sinuolate or denticulate near apex; cells narrow. Capsule oblong-cylindric; teeth orange densely articulate; annulus perfect; lid rostrate; pedicel somewhat long. Perichetial leaves long-pointed. Branches less turgid and less crowded. — Trees r. *Amer.* Can.: White, com. Macoun. U. S.: Sawyer, com. Cardot.

bb. Branches compressed. Leaves us. obtusate; costa us. indistinct.

4.**E.cladorhizans** Hedwig. — Neckera H.; Entodon C. Mueller in part; Cylindrothecium Sulliv. icon. musc.

Leaves oval-ovate abruptly contracted to a short deflexed point or obtuse, not cucullate and not distinctly denticulate; alar cells small not well-defined on a short-triangular space. Capsule subcylindric; teeth red below, pale above; annulus broad revoluble; lid acute or apiculate; pedicel about 2—3 centim. long. Branches crowded faintly compressed. Tufts dense green or brown-yellow. — Rocks and logs in woods. *Amer.* Can. r.: Macoun.

* **E.transsilvanicus** Demeter in revue bryol. 1885. — E. cladorhizans *minutipes Kindb. in sched.

Peristome paler. Pedicel of capsule less than 1 centim. long. — Logs r. *Eur.* near Moscou: Zickendrath. *Amer.* Can.: Macoun Canad. m. 263.

5.**E.Schleicheri** Br. eur. — Cylindrothecium Br. eur ; Entodon Brotherus enum. muscor. Caucas.

Differs from *E. cladorhizans*: Leaves often cucullate at apex; alar cells on a narrow-triangular space. Capsule with narrow persistent annulus; lid conic obtuse or acute. Branches less crowded and more compressed. Tufts somewhat loose sparingly radiculose us. green. — Rocks and stony earth. *Eur.* south. distr. Italy, Switzerl.! France: Schimper.

6.**E.compressus** Hedwig. — Leskea H.; Entodon C. Mueller; Cylindrothecium Sulliv. icon. musc.

Differs from *E. cladorhizans*: Capsule oblong-cylindric; teeth red; lid rostrate; pedicel often short. Branches more compressed gen. distant. Tufts sparingly radiculose green or light brown. — Logs r. *Eur.* »Russia: Pallas»: Lindberg. *Amer.* Can.: Macoun. U. S.: Sullivant, com. C. Mueller; Austin, com. Macoun.

7.**E.Drummondii** Bruch et Schimper. — Cylindrothecium Br. et Sch.; Entodon Kindb.

Leaves narrowly ovate-oblong acute or short-acuminate, denticulate near apex, less crowded; alar cells large on a short-triangular space, inner basal sometimes similar Perichetial leaves serrulate at acumen. Capsule oblong cylindric, substrumose at base; annulus indistinct; lid rostrate; pedicel long. Branches complanate. Tufts green sparingly radiculose. — Stones and logs r. *Amer.* U. S.: Langlois, com. Cardot.

B. Leaves long-acuminate crowded; costa gen. indistinct.

a. Leaves nearly entire. Endostomial segments wanting.

8.**E.brevisetus** Hooker et Wilson. — Neckera H. W.; Entodon Kindb.; Cylindrothecium Br. et Sch.; Sull. ic. m.

Leaves from ovate-oblong base abruptly narrowed to a subulate filiform-pointed acumen; alar cells large on a narrow-triangular or sublinear space. Capsule subcylindric; teeth pale red; annulus broad loosed in pieces or revoluble; lid obtuse; pedicel often short. Branches crowded faintly compressed. Tufts dense green or brown. Monoecious. -- On prostrate trees r. *Amer*. Can.: Moser. U. S.: Sullivant, com. C. Mueller; Austin, com. Macoun.

b. Leaves denticulate nearly all around. Capsules unknown.

9.**E.acicularis** C. M. et Kindb. cat. Canad. m.

Leaves with subovate base and subulate or filiform-pointed acumen, with difficulty loosed from the stem; inner basal cells narrow, angular suboval numerous, special alar r. distinct. Branches julaceous. Tufts compact radiculose. Probably dioecious. — Rocks r. *Amer*. Can.: Macoun.

10.**E.Macounii** C. M. et Kindb. l. c.

Leaves with subovate or ovate-oblong base and subulate acumen; lower basal cells suboval nearly similar not large. Branches complanate. Tufts green sparingly radiculose. Dioecious. — Logs r. *Amer*. Can.: J. Macoun.

32. Platygyrium Bryol. eur.

1.**P.repens** Bridel. — Pterigynandrum Brid.; Platygyrium Br. eur.

Leaves recurved entire ovate-oblong or ovate-lanceolate, acuminate without filiform point; upper cells rhomboidal-oblong, middle lanceolate-linear, alar quadrate often orange on a triangular space. Perichetial leaves entire long-subulate, orange at base. Capsule oval-oblong or subcylindric; teeth orange; segments yellow linear-subulate entire, not connated at base, shorter than teeth without basal membrane; lid rostellate; pedicel gen. not long. Tufts us. glossy green. Branches short, often curved, sometimes with small branchlets to propagation. Dioecious or pseudo-monoecious. Resembles *Pylaisia* and *Hypnum perichætiale*. — On trees or r. on rocks. *Eur*. not common, r. fruiting. Sweden, Norway, Switzerl.! *Amer*. Can.: Macoun. U. S.: Sullivant, com. C. Mueller.

2.**P.brachycladon** Bridel. — Pterigynandrum Brid.; Platygyrium Kindb.; Neckera C. M. syn.

Differs from the last: Endostomial segments orange linear connated at base and not shorter than teeth; lid of capsule rostrate; monoecious. Branches straight elongate. — Trees r. *Amer*. Can.: Macoun. U. S. Michigan: Purpus, com. Roell.

33. Tripterocladium C. Mueller in Flora 1875, as subgenus.

A. Branch-leaves denticulate nearly all around.

1.T.leucocladulum C. M. — Hypnum C. M. l. c.

Leaves pellucid, recurved below middle; cells small short, alar dusky numerous. Stem-leaves entire below acumen, gen. ovate-oblong long-acuminate; cells gen. narrow. Branch-leaves subovate smaller; cells gen. oval-oblong. Perichetial leaves sharply serrate. Capsule small cylindric-oval suberect; endostome without basal membrane; lid conic acute; pedicel short. Perigonial leaves entire broad-oval obtuse. Stem pinnate; branches slender julaceous. — *Amer.* Western distr. r. U. S.: Harwey, com. C. Mueller; Leiberg, com. Roell.

2.T.compressulum C. Mueller l. c.

Differs from the last: Leaves subovate gen. short-acuminate, those of stem faintly denticulate nearly all around. Stem irregularly divided. »Capsule cernuous narrowly cylindric»: C. M. — *Amer.* Pacif. distr. r. U. S.: Neeve, com. C. Mueller.

B. Leaves gen. entire, only those of branches faintly denticulate near apex. Capsules unknown.

3.T.rupestre Kindb. cat. Can. m. — Platygyrium Kindb. bull. Torr. club XVII.

Leaves gen. subovate. Stem irregularly divided. Tufts intricate. — Differs from the both last: Stem-leaves more broadly revolute to above middle; branch-leaves often obtusate acute; alar cells more numerous. — Rocks r. *Amer.* Can. Brit. Col.: Macoun.

Fam. 11. Climaciaceæ.

34. Climacium Weber et Mohr.

1.C.dendroides L. — Hypnum L.; Climacium W. M.

Stem-leaves broadly ovate-oblong apiculate entire not decurrent. Branch-leaves ovate-lanceolate obtuse with subcordate base, denticulate above middle, sharply dentate at apex; upper cells linear-lanceolate, lowest inner basal shorter and wider, alar and lower basal us. red-brown. Perichetial leaves costate. Capsule cylindric not long; teeth purplish brown; lid with not long beak. Less often fruiting. — Wet meadows and rocks r. on trees or in water. *Eur.* common! *Amer.* r. Can.: Macoun. U. S.: Henry, com. Cardot.

In a variety, floating in water, stem is irregularly divided. *Eur.* Sweden: E. Nyman.

In an other variety (forma *depauperata* Boulay?), growing on trees, the naked part of stem is nearly indistinct, leaves are densely appressed when dry, their alar cells hyaline. *Eur.* Norway near Lillehammer!

2.C.americanum Bridel; Sullivant icon. muscor.

Stem-leaves obtuse entire long-decurrent gen. broad-ovate; costa subpercurrent. Branch-leaves acute ovate-oblong cordate, denticulate from base, sharply serrate above middle; inner basal cells somewhat dilated. Perichetial leaves nerveless. Capsule long-cylindric; lid long-rostrate; teeth orange-red. Often fruiting. — Logs and roots of trees. *Amer.* common princ. in Pacif. distr. Alaska: J. M. Macoun. Can.: J. Macoun. U. S.: Sullivant, com. C. Mueller; A. G. Wetherby; com. Renauld and Cardot.

In a variety (*C. americanum* var. *Kindbergii* Renauld et Cardot) leaves are shorter and broader; those of stem rotundate-ovate, those of branches ovate. — *Amer.* U. S.: com. Renauld and Cardot.

35. **Alsia** Sullivant.

1.A.longipes Sullivant et Lesquereux; Sulliv. icon. m.

Stem-leaves obtusate ovate-oblong denticulate above; branch-leaves ovate-lanceolate acute, obtusate or short acuminate, serrate above, entire and recurved below; upper cells round-oval, lower suboblong; costa dentate above at back, reaching to acumen. Capsule cylindric erect; segments rimose; cilia appendiculate; lid rostrate. Branches pinnate slightly curved, not much turgid. Dioecious. — Rocks r. *Amer.* U. S.: Bolænder, com. Renauld.

2.A.circinnata Bridel. — Hypnum Brid.; Alsia Kindb.; Eurhynchium Bryol. eur.

Lower stem-leaves from broad-ovate base long-acuminate, minutely denticulate; upper cells lanceolate-linear, lower oblong-lanceolate; costa vanishing in acumen. Branch-leaves small ovate-oblong acute, serrate above, denticulate and recurved below; inner cells gen. suboblong, middle suboval; costa subpercurrent dentate at back. Capsule subovate inclined or horizontal, not or slightly curved; segments split; cilia and lid as in the last. Branches turgid circinnate subpinnate. Dioecious r. fruiting. Habit of *Isothecium Breweri* and *Pterogonium*. — Earth and stone r. *Eur.* Italy: Bottini; Roell; Arcangeli. France: Henry, com. Husnot. Engl.: Curnow. Irel.: Holt.

Scorpiurium rivale Schimper, differing in ovate obtusate entire leaves with suboval cells, is by Prof. Boulay regarded as a state of this species. — In water r. *Eur.* France: Boulay, com. Husnot.

36. **Isothecium** Bridel.

A. Branches not compressed.

1.**Myura**. Leaves gen. obtusate or short-pointed, not decurrent; upper cells (either on stem- or branchleaves) rhombic-oblong; costa gen. short. Branches us. curved, often julaceous. Dioecious.

2.**Myosuroidea.** Leaves gen. long-acuminate, often short-decurrent; borders not or near base recurved; upper cells lanceolate; costa us. reaching to acumen. Branches not julaceous, often curved. Dioecious not often fruiting.

3.**Stolonifera.** Leaves long-acuminate us. recurved to acumen; cells linear; costa reaching to or in acumen. Branches not julaceous, us. straight, often with numerous flagellæ (stolons). Monoecious or pseudo-monoecious often fruiting.

B. Branches compressed.

4.**Thamnioidea.** Leaves small not decurrent, subdistichous gen. obtusate; upper cells suboval or rotundate. Branches r. curved. Dioecious.

1. Myura.

A. Leaves obtusate or short-acuminate.

a. Stem-leaves entire at least below middle; costa short faint.

1.**I.myurum** Pollich. — Hypnum Poll.; Isothecium Bridel.

Stem-leaves suboblong acute gen. obtusate, denticulate above; branch-leaves oblong-lanceolate short-acuminate faintly denticulate; upper cells rhombic-oblong, lower sublinear, alar rotundate on a round or short-triangular space; costa vanishing near middle. Perichetial leaves serrate above middle, subulate acuminate sometimes filiform-pointed. Capsule cylindric-oblong erect; teeth pale yellow; segments pale as high; cilia short; lid apiculate or rostellate; pedicel smooth. Branches crowded fasciculate not julaceous. Tufts loose green. Not r. fruiting. — Trees, rocks and earth in woods. *Eur.* common. Sweden, Germany, Switzerl.!

2.**I.circinnans** Schimper. — Hypnum Sch.; C. M. syn.; Isothecium Sauter; I.myurum var. robustum Schimp. syn. in part.

Differs from the last: Leaves larger and broader, oval-oblong subobtuse entire; perichetial entire with very short acumen. Stem pinnate; branches julaceous often acute. Tufts dense. — Rocks r. *Eur.* Spain, Switzerl.! France: Husnot.

3.**I.aplocladum** Mitten.

Stem-leaves from ovate-oblong base abruptly narrowed to a short subulate or filiform point, faintly denticulate above; cells sublinear also at apex; costa short but distinct. Branch-leaves oval-oblong obtusate obtuse or subacute, serrate nearly all around; apical cells suboblong; costa vanishing near middle. Stem pinnate not radiculose; branches curved nearly crowded and subjulaceous. Tufts brown-green. »Capsule suberect oval-cylindric; lid acuminate; pedicel slightly rough»: Lesq. et Jam. — *Amer.* Pacif. distr. r. Can.: Macoun. U. S. Oregon mt Hood: Roell.

4.**I.brachycladon** Kindb. revue bryol. 1895.

Differs from the last: Leaves smaller; those of stem subovate nearly entire with very short or indistinct costa; branch-leaves sometimes short-acuminate. Stem creeping irregularly divided; branches distant very short, slightly curved and not julaceous. Tufts bright green. Capsules unknown. Habit of *I. striatulum.* — Under damp rocks r. *Amer.* Can. Vanc. isl.: Macoun 1893.

b. Stem-leaves denticulate below middle; costa thick reaching to $^3/_4$. Leaves not large.

5.**I.Breweri** Lesquereux. — Hypnum Lq.; Isothecium Kindb.

Stem-leaves ovate acute or short-acuminate, denticulate below, serrate above; branch-leaves suboblong acute more sharply serrate; upper and middle cells rhombic or oblong-rhomboidal, lower lanceolate, alar short on a long space. Perichetial leaves abruptly contracted to a very long subulate serrate acumen. Capsule small subcylindric erect or inclined; teeth yellow higher than segments; cilia long; lid acute. Tufts dense subintricate us. brown and glossy. Stem subpinnate; branches crowded julaceous. Habit of *Pterogonium.* — Rocks r. *Amer.* Pacif. distr. Can.: Macoun. U. S.: Brewer, Henderson and Miss Mann, com. Cardot.

6.**I.myurellum** Kindb. bull. Torr. club XVII.

Differs from the last: Leaves more sharply serrate above; cells narrower, middle linear, alar disposed on a short space. Perichetial leaves nearly entire with short filiform point. Capsule suboval; lid mamillate or subapiculate. Tufts loose not glossy, often dark green. Stem pinnate; branches distant. — Trees r. *Amer.* Pacif. distr. Can.: Macoun. U. S.: Bolænder, com. Cardot.

7.**I.hylocomioides** Kindb. — I. myosuroides subsp., Kindb. note on Canad. bryol. 1893.

Differs from *I. Breweri*: Leaves shorter, subovate gen. subobtuse, more sharply serrate above to below middle; apical cells oval-oblong, middle and lower linear, alar disposed on a short space. Perichetial leaves minutely denticulate. Capsule cylindric oblong sometimes curved; teeth pale yellow; cilia short;

lid not seen. Tufts loose green or brown-green. Stem bipinnate; branches numerous not julaceous, often with short flagellæ. — Rocks r. *Amer.* Can. Vanc. isl.: Macoun.

B. Leaves gen. long-acuminate, ovate-oblong or ovate-lanceolate; costa thick gen. long. Stem irregularly pinnate. Leaves somewhat large.

8.**I.thamnioides** Kindb. n. sp. — »I. aggregatum» Kindb. cat. Can. m.

Stem-leaves denticulate below, serrate or twice serrulate above; upper cells rhombic or rhomboidal. Branch-leaves serrate nearly all around; upper cells lanceolate-linear, middle and lower sublinear, alar disposed on a short space. Perichetial leaves serrate. Capsule cylindric inclined or slightly curved; lid short-acuminate; teeth yellow; cilia short appendiculate. Tufts loose glossy green. Branches long-attenuate nearly crowded not julaceous. — Rocks r. *Amer.* Can. Brit. Col. and Vanc. isl.: Macoun.

9.**I.aggregatum** Mitten. — Hypnum Mitt.; Isothecium Kindb.

»Lower leaves spreading broadly hastate ovate-acuminate subecostate; those on the middle of the branches broadly ovate; those near the top costate-acuminate subjulaceous imbricate serrulate toward the acute apex. Perichetial leaves ovate-lanceolate acuminate nerved to middle, serrate and reflexed at apex. Capsule cylindrical irregular inclined; lid conical acuminate; segments narrow (?); cilia solitary short. The author compares it, on account of the julaceous imbrication of the leaves, to some states of *Pterogonium gracile*, while other stems have a resemblance to *Hypnum myurum*. — *Amer.* Vanc. isl. and Brit. Col.»: Lesq. et Jam. man.

10.**I.Howei** Kindb. revue bryol. 1895.

Leaves entire below middle, serrate above, often filiform-pointed; areolation as in *I. Breweri*; costa vanishing near middle. Capsule erect subcylindric. Branches crowded subjulaceous somewhat long and numerous. Tufts dirty green not glossy. — On decaying branches r. *Amer.* U. S. California: Marshall A. Howe.

2. Myosuroidea.

A. Middle and lower inner leaf-cells linear, alar finally yellowish. Branch-leaves not striate. Lid of capsule acute or short-rostrate. Stem often distinctly tree-like.

11.**I.myosuroides** L. — Hypnum L.; Isothecium Bridel; Eurhynchium Schimper.

Leaves serrulate all around, recurved only near base, subdecurrent not densely crowded; alar cells numerous finally yellow on a suboval space; costa smooth well-distinct gen. long but not reaching to acumen. Stem-leaves subovate short-acuminate often with long filiform point; branch-leaves narrowly ovate-oblong long-acuminate with short filiform point. Perichetial leaves contracted to a long serrulate subulate filiform-pointed acumen. Capsule subcylindric us. inclined; cilia short; lid short-rostrate. Stem suberect or decumbent; branches sometimes flagellate. Tufts loose us. green. — On rocks and base of trees. *Eur.* not r. Sweden, Norway, Switzerl.! *Amer.* r. Can. (not in Pacif. distr.): Macoun; Waghorne.

12.**I.Holtii** Kindb. revue bryol. 1895.

Differs from the last: Leaves shorter and crowded; those of branches broad-ovate subobtuse without filiform point. Capsule suboval larger. Stem rigid; branches subjulaceous. — Stones by rivers r. *Eur.* Engl. Wales: G. A. Holt 1885.

13.**I.tenuinerve** Kindb. check-list of Eur. and N. Amer. mosses. — I. myosuroides brevinerve Kindb. note on Can. bryol. 1893.

Differs from *I. myosuroides*: Leaves narrower with long filiform point; alar cells often finally brown on a round space. Stem-leaves nearly entire; branch-leaves ovate-lanceolate; costa us. faint vanishing far below acumen, sometimes double or indistinct. Lid of capsule conic acute not rostellate. — Rocks in woods. *Eur.* not r. Sweden! Germany: Huebner. France: Husnot m. Gall. Færoer: com. C. Jensen. *Amer.* r. Can.: Waghorne.

14.**I.acuticuspis** Mitten; Lesq. et Jam. man.

»Leaves loosely imbricate; those below the perichætium cordate-ovate narrowly long-acuminate, minutely serrulate on the borders, nearly smooth at the cuspidate apex, with a very short diffused costa, forking or entire, vanishing in middle; cells of basal angles obscured or dusky; leaves of branchlets elliptical-ovate acute serrulate nerved to the middle; the perichetial subulate from an oblong ecostate base, recurved, very entire. Capsule oval inclined; pedicel short; lid conical; cilia short. — Mitten, who had seen only two stems of this moss, says that it may be *H. Brewerianum* Lesq., but that the description of that species is not sufficiently complete to be quite certain. — *Amer.* Brit. Col.: Douglas»: Lesq. et Jam. l. c. (Authentical specimens not seen).

B. Leaf-cells oblong-lanceolate, lowest basal oval-quadrate, alar green. Branch-leaves faintly striate. Lid of capsule long-rostrate. Stem decumbent; branches short.

15.**I.striatulum** Spruce. — Hypnum Spr.; Isothecium Kindb.; Eurhynchium Schimp.; »Hypnum filescens Bridel»: C. M. syn.

Leaves serrulate all around, recurved below, subdecurrent not densely crowded; costa long stout often rough at back. Stem-leaves subovate with long subulate or filiform often twisted acumen. Branch-leaves ovate or broadly ovate-oblong, short-acuminate without filiform point. Capsule oval-oblong; cilia long. Tufts green not glossy. Resembles often *I. myosuroides* in habit. Very r. fruiting. — Rocks r. *Eur.* Switzerl.! Sweden: Lindberg. France: Philibert. Italy: Arcangeli.

3. Stolonifera.

16.**I.stoloniferum** Hooker. — Hypnum Hook.; Isothecium Bridel.

Leaves small ovate-lanceolate with long often filiform-pointed acumen, serrate above, entire below middle, decurrent; alar cells on a short space. Perichetial leaves long-subulate with filiform point. Capsule oval-oblong; teeth pale; cilia long; lid acute or apiculate. Tufts soft green or whitish green, faintly or silky glossy. Branches crowded; flagellæ numerous long slender. — Trees. *Amer.* Pacif. distr. not uncommon. Can.: J. Macoun. Alaska: J. M. Macoun. U. S.: Howell, com. Cardot.

17.**I.spiculiferum** Mitten.

Differs from the last: Leaves larger, serrate nearly all around, not decurrent; perichetial short-subulate. Capsule oblong; teeth pale; cilia short. Tufts less soft us. brownish and glossy. Branches shorter, less slender, often less crowded; flagellæ often wanting. — Trees. *Amer.* Pacif. distr. not uncommon. Can.: Macoun; Roell. U. S.: Roell, com. Cardot.

18.**I.Cardoti** Kindb. bull. Torr. club XVII.

Leaves larger than in the both last, shorter acuminate; those of stem faintly denticulate below with an at apex twisted acumen; cells often yellow. Perichetial leaves long-subulate. Capsule oval; teeth yellow; cilia long; lid acute. Stem often pinnate; branches not crowded; flagellæ thick r. present. More robust than the both last. Tufts us. brown. — Trees r. *Amer.* Pacif. distr. Can.: Macoun. U. S.: Roell, com. J. Cardot.

4. Thamnioidea.

19.**I.obtusatulum** Kindb. revue bryol. 1895.

Stem-leaves broad-ovate short acuminate acute, recurved below, serrate above; branch-leaves smaller, suboval obtusate often obtuse; upper (sometimes also the middle) cells oval or broad-oblong, middle narrowly oblong or sublanceolate; costa reaching to $^{3}/_{4}$ or shorter. Capsule oblong; teeth yellowish; cilia nodose shorter; lid muticous acute. Stem pinnate; branches gen. distant, often flagelliferous. Tufts dark green. — Rocks r. *Amer.* Can. Vanc. isl.: Roell 1888, Macoun 1893.

20.**I.Holzingeri** Renauld et Cardot. — Thamnium Ren. et Card.; Isothecium Kindb.

Differs from the last: Leaves more obtuse, not recurved, less crowded; nearly all cells suboval or broad-oval, upper round-hexagonal. Stem-leaves oblong-lingulate obtusate gen. obtuse; branch-leaves ovate-oblong often subacute. Lid of capsule with oblique beak. — *Amer.* r. U. S. Californ.: Marshall A. Howe.

37. **Pterogonium** Swartz.

1.**P.ornithopodioides** Hudson. — Hypnum Huds.; Pterogonium Lindberg; P. gracile Swartz.

Leaves from broad-oval base gen. short-acuminate, more or less sharply serrate at acumen; angular cells rotundrate-quadrate, inner basal elongate; middle cells oval; costa vanishing near middle. Capsule subcylindric; lid subapiculate; calyptra hairy; pedicel long. Branches thick julaceous curved when dry. R. fruiting. — Rocks and trees gen. r. *Eur.* not r. in south. distr. Switzerl.! *Amer.* r. U. S.: Brewer, com. Cardot.

38. **Hylocomium** Bryol. eur.

A. Stem with gen. numerous paraphyllia.

a. Stem simply pinnate. Leaves somewhat large; costa sometimes simple.

I. **Eu-Hylocomium.** Leaves not mamillose. Pedicel of capsule smooth.

b. Stem us. bi- or tripinnate. Leaves gen. small; costa double.

II. **Pleurozium.** Leaves mamillose. Pedicel smooth.

III. **Hyocomium.** Leaves not mamillose. Pedicel rough.

B. Stem simply pinnate without paraphyllia.

IV. **Hypnopsis.** Leaves somewhat large, sometimes mamillose; costa often simple. Pedicel r. rough.

I. Eu-Hylocomium.

A. Stem-leaves serrate only at apex. Branch-leaves sharply serrate or fimbriate also below middle. Branches subjulaceous often turgid.

1.**H.pyrenaicum** Spruce. — Hypnum Spr.; Hylocomium Lindb.; Hypnum fimbriatum Hartman; H. Oakesii Sull. ic. m.; Hylocomium Schimp.

Leaves orange at insertion; alar cells not defined; costa often simple. Stem-leaves ovate acute sometimes short-acuminate;

branch-leaves ovate-oblong or ovate-lanceolate often long-acuminate. Capsule suboval; lid conic mamillate. Stem red; paraphyllia numerous. R. fruiting. — Earth and rocks princ. in alps gen. r. *Eur.* Norway, Switzerl.! Sweden: Hartman. *Amer.* Can.: Macoun; Waghorne.

B. Leaves denticulate or serrate all around. Branches not turgid.

a. Leaves green; costa double.

2.**H.brevirostre** Ehrhart. — Hypnum Ehrh.; Hylocomium Br. eur.

Stem with numerous paraphyllia. Leaves diversiform; angular cells small suboblong hyaline, the lower (special alar) brown somewhat large. Stem-leaves from very broad-cordate base abruptly tapering to a narrowly subulate acumen, brown at insertion, minutely denticulate. Branch-leaves serrate ovate-oblong gen. gradually acuminate. Perichetial leaves pale green abruptly narrowed to the dentate us. subulate, patent or deflexed acumen, often serrate below it. Capsule oval-oblong curved; lid us. rostellate. — Earth, stone and trees. *Eur.* not r. Sweden, Germany, Switzerl.! *Amer.* r. Can.: Macoun; Moser. U. S.: A. G. Wetherby.

3.**H.calvescens** Wilson. — Pleurozium Kindb. rev. bryol. 1895.

Stem with few paraphyllia. Leaves uniform subdistant denticulate from cordate broad-ovate base gradually long-acuminate; angular cells large hyaline, only the lowest brown. Perichetial leaves hyaline nearly gradually narrowed to the serrate falcate filiform-pointed acumen. Capsule suboval curved; lid mamillate or subacute. Very r. fruiting. Resembles the last and *Hypnum squarrosum*, from which it differs in leaves not falcate when moist, shorter pedicel of capsule etc. — Earth in woods r. *Eur.* Sweden: Hj. Holmgren, com. M. Huss; Arnell; E. Nyman; P. Dusén. Norway: Zetterstedt. Finl.: V. F. Brotherus.

b. Leaves serrate sometimes brown-green; costa simple. Paraphyllia few.

4.**H.striatum** Schreber. — Hypnum Schreb.; Hylocomium Kindb. Laubm. Schw. u. Norw.; Eurhynchium Br. eur.

Leaves subdistant green very plicate when dry; alar cells few large subrectangular hyaline; costa vanishing in acumen. Stem-leaves broad-ovate obtusate; branch-leaves acuminate narrower; perichetial hyaline with dilated cells, denticulate above middle of basal part. Capsule large arcuate finally blackish; lid rostrate. Stem not decumbent; branches distant often attenuate.

Not r. fruiting. Earth and stone in woods. *Eur.* not uncommon. Sweden, Germany, France, Switzerl.!

5. **H. meridionale** Schimper. — Hypnum Sch.; Hylocomium Kindb.

Leaves crowded brown-green faintly striate; angular cells numerous oval-rectangular not large, lower dusky. All leaves long-acuminate with very broad subcordate base, often filiform-pointed, nearly spreading when moist; costa vanishing at base of acumen. Perichetial leaves yellow with very narrow cells, denticulate only at acumen Capsule small subobovate brown; lid rostellate; pedicel much shorter than in the last. Stem decumbent; branches crowded obtuse often curved. Very r. fruiting. — On stone r. *Eur.* France: Husnot; Philibert; Berthoumieu. Italy: Bottini; Arcangeli. Spain: Dieck, com. Roell.

II. Pleurozium Sullivant.

6. **H. proliferum** L. — Hypnum L.; Hylocomium Lindberg; H. splendens (Hedw.) Br. eur.

Basal stem-leaves long-acuminate us. hyaline; middle (larger) stem-leaves decurrent ovate-oblong abruptly short-acuminate, serrate above middle; basal cells numerous purplish or r. orange, angular dilated subrectangular. Branch-leaves suboblong obtusate often acute, minutely denticulate above. Capsule suboblong or arcuate; lid rostrate; pedicel long. Stem proliferous by new shoots; branches large distant. — Earth in woods common. *Eur.* Sweden etc.! *Amer.*: Macoun etc.

7. **H. alaskanum** James. — Hypnum Jam.; Hylocomium Kindb.

Less robust than the last, often simply pinnate; branches us. crowded. — Stem-leaves smaller not decurrent more crowded, ovate obtuse or short-pointed, faintly serrulate above; lower basal cells reddish not numerous, angular indistinct. Branch-leaves subovate or suboblong gen. obtuse nearly entire. Capsules unknown. — On earth in open heaths princ. in alps. *Eur.* Norway! Sweden (below alps)! Spetsbergen: R. Gyllencreutz. Switzerl.: Culmann, com. Husnot. *Amer.* Alaska: J. M. Macoun; Dall, herb. James, com. C. Mueller. Can.: Macoun; Waghorne.

III. Hyocomium Br. eur. in part.

8. **H. umbratum** Ehrhart. — Hypnum Ehrh.; Hylocomium Br. eur.

Leaves sharply fimbriate, at least those of branches; lower basal cells dilated. Stem-leaves ovate-oblong short-acuminate; branch-leaves oblong-lanceolate. Capsule oval-oblong; lid conic apiculate; pedicel faintly rough. Not often fruiting. — Stones, logs and earth in woods. *Eur.* not r. Norway, Switzerl.! *Amer.* r. Can.: Macoun; Waghorne.

9.**H.flagellare** Dickson. — Hypnum Dicks.; Hylocomium Kindb. Laubm. S. u. N.

Leaves sharply serrate all around; angular cells dilated oval-oblong very numerons. Stem-leaves from short base long-acuminate, sometimes filiform-pointed; branch-leaves shorter-acuminate. Capsule oblong; lid apiculate. R fruiting. — Wet rocks near running water r. *Eur.* Spain! Engl.: Holt.

IV. Hypnopsis Kindb.

A. Pedicel of capsule smooth. Costa of leaves us. double.

a. Leaves denticulate mamillose very large, squarrose.

10.**H.triquetrum** L. — Hypnum L.; Hylocomium Sch.

Leaves densely crowded, often striate; nerves us. two. Stem-leaves ovate-cordate acute sometimes short-acuminate; branch-leaves longer-acuminate; angular cells dilated subrectangular hyaline. Capsule arcuate, striate when dry; teeth purplish; cilia long; lid acute or apiculate. Stem erect. Earth in woods, gen. common. — *Eur.*! *Amer.*: Macoun etc.

b. Leaves not mamillose, appressed when dry; those of stem entire or indistinctly denticulate.

11.**H.Schreberi** Willdenow. — Hypnum W.; Hylocomium Kindb.; Hylocomium parietinum Lindberg.

Stem red; branches gen. not turgid. Leaves not or faintly striate; upper cells lanceolate, middle sublinear, lower inner oblong-lanceolate often yellow; angular cells suboval red-yellow, special alar not well-defined; costa short double. Stem-leaves broad-ovate entire obtuse or apiculate; branch-leaves oblong subacute denticulate at apex. Capsule suboblong arcuate; teeth pale; segments open in middle; lid acute; pedicel long or short. Not r. fruiting. — Earth in woods and heaths common. *Eur.*! *Amer.* Macoun etc.

12.**H.purum** L. — Hypnum L.; Hylocomium Notaris.

Stem pale or yellowish; branches turgid. Leaves striate us. green; cells green, lowest basal large suboval, alar not much larger, the others gen. linear; costa short double or simple reaching above middle. Stem-leaves round-oval abruptly narrowed to a short subulate point, nearly entire; branch-leaves suboblong subacute denticulate all around. Capsule suboblong arcuate; teeth yellow; segments split in middle; lid rostellate; pedicel us. long. R. fruiting. — Earth in woods and heaths.

Eur. not uncommon. Sweden, Germany, Switzerl.! *Amer.* »Miquelon isl.»: Cardot.

B. Pedicel of capsule rough. Costa of leaves simple.

13.**H.megaptilum** Sullivant. — Camptothecium Sull. icon. musc.; Hylocomium Kindb.

Stem pale, branches thick not distinctly turgid. Leaves plicate shining not decurrent, green or finally yellowish, larger than in the last; costa dentate at back vanishing near or above middle. Stem-leaves entire broadly ovate-oblong abruptly narrowed to a somewhat long subulate filiform-pointed acumen; alar cells few small suboval, the others linear. Branch-leaves denticulate above middle, serrate in upper part, gen. ovate-oblong, obtusate with short broad subacute point; apical cells lanceolate-oblong, the others linear exc. the alar. Perichetial leaves long-subulate. Capsule large oval-oblong or arcuate; teeth yellow; segments entire; cilia long appendiculate; pedicel often long. Often pseudo-monoecious. — On ground in woods r. *Amer.* U. S. princ. in Pacif. distr.: Hall and Howell, com. Macoun; Leiberg, com. Mrs Britton.

39. **Girgensohnia** (Lindberg, as subgenus) Kindb.

1.**G.ruthenica** Weinmann. — Hypnum Weinm.; Climacium Lindb.; Sulliv. icon. m.

Lower stem-leaves squamiform hyaline entire. Other stem-leaves broad round-ovate obtuse short-pointed; branch-leaves broadly ovate-lanceolate subobtuse long-decurrent, denticulate below middle, sharply serrate above; upper cells lanceolate-oblong, lower inner sublinear; costa dentate at back not percurrent. Capsule oblong-cylindric; lid conic acute or apiculate; pedicel not long. — *Amer.* r. Alaska: J. M. Macoun.

40. **Thamnium** Bryol. eur.

A. Leaves sharply serrate above, gen. large; costa dentate above or smooth, not percurrent.

a. Stem-leaves broad subovate. Lid of capsule rostrate; cilia of endostome long appendiculate.

1.**T.alopecurum** L. — Hypnum L.; Thamnium Br. eur.

Branches more or less compressed sometimes flagelliferous. Middle stem-leaves ovate subobtuse or acute not fimbriate; branch-leaves narrow-oblong acuminate acute; middle cells oval-oblong, inner basal sublinear; costa dentate subpercurrent. Capsule suboblong; pedicel nearly straight us. prolonged. Dioecious not often fruiting. — Shaded often damp rocks. *Eur.* not r. Sweden, Switzerl.!

2.**T.Leibergii** Britton.

Differs from the last: Leaves broader, those of branches broadly oval-oblong less acuminate; cells larger, middle oval, lower oblong-linear; costa shorter. Capsule suboval; pedicel somewhat short. — Damp rocks r. *Amer.* Can.: Macoun. U. S.: Roell; Leiberg, com. Mrs Britton.

3.**T.alleghaniense** C. Mueller. — Hypnum C. M.; Sulliv. icon. m.; Thamnium Schimper.

Branches turgid. Middle stem-leaves ovate obtuse often fimbriate above; branchleaves suboval obtusate subacute very concave; cells not much larger than in *T. alopecurum*, middle oval, inner basal oblong-linear; costa thick nearly smooth not much long. Capsule suboblong; pedicel curved not long. Sometimes synoecious or monoecious. — Damp rocks and shaded banks. *Amer.* not r. Can. r.: Macoun. U. S.: Austin, com. Macoun.

b. Stem-leaves broadly ovate-lanceolate. Capsules unknown.

4.**T.Toccoæ** Sullivant et Lesquereux. — Anomodon S et Lq.; Sull. icon. musc.; Thamnium Kindb.

Branches turgid often curved. Leaves sharply serrate or fimbriate above; cells very small nearly all uniform seriate; costa smooth subpercurrent. Stem-leaves acute with short acumen or point, faintly recurved below; inner cells suboval, few apical sometimes sublinear. Branch-leaves smaller narrower longer-acuminate more distinctly recurved. Perichetial leaves narrow filiform-pointed costate. — Rocks r. *Amer.* U. S. Georgia: Lesquereux, com. Renauld; Small, com. Roell.

c. Leaves narrow, those of stem lanceolate-linear, those of branches sublanceolate. Capsules unknown.

5.**T.angustifolium** Holt.

Middle stem-leaves acuminate serrate; middle and lower cells suboval; costa thick very broad below. Branches more slender than in *T. alopecurum*. — Wet rocks r. *Eur.* Engl.: G. A. Holt.

B. Leaves small narrow sharply serrate all around; costa dentate at back in its whole length, percurrent or subexcurrent. **Capsules unknown.**

6.**T.micro-alopecurum** Kindb. rev. bryol. 1895.

Leaves suboblong decurrent: cells nearly uniform round-rhombic or subquadrate; costa narrow. Stem low; branches turgid. — *Amer.* r. U. S. Oregon: J. A. Hertzman, com. E. Nyman 1886.

Fam. 12. **Thuidiaceæ.**

41. **Myurella** Bryol. eur.

A. Leaves densely crowded not acuminate, soon becoming whitish green. Perichetial leaves subulate-acuminate r. with filiform point. Capsule with very short or indistinct neck.

1.**M.julacea** Villars. — Hypnum Vill.; Myurella Br. eur.

Leaves round-ovate obtuse faintly denticulate us. not strongly papillose, r. with short filiform point. Capsule suboblong; cilia short; lid conic. Tufts sparingly, gen. only at base, radiculose. R. fruiting. — On rocks or on base of trees. *Eur.* not r. Sweden, Norway, Switzerl.! *Amer.* r. Can.: Macoun.

***M.gracillima** Kindb. n. subsp. — M. julacea var. gracilis Kindb. Laubm. Schwed. u. Norw.

Leaves, at least the upper, acute with filiform point, smaller than in our other species. Tufts compact densely radiculose also above. Capsules unknown. — Alp. rocks r. *Eur.* Norway near Kongsvold!

B. Leaves distant acuminate filiform-pointed; perichetial also with filiform point. Capsule distinctly necked. R. fruiting.

2.**M.tenerrima** Bridel. — Pterigynandrum Brid. 1819; Myurella Lindb.; M. apiculata (Hueb.) Br. eur.

Leaves slightly papillose faintly denticulate not much distant, subovate nearly gradually acuminate. Capsule obovate; cilia long; lid conic. — Alp. rocks r. *Eur.* Norway! »*Amer.*»: Berggren; Lesq. et Jam.

3.**M.gracilis** Weinmann. — Hypnum Wm. 1845; Myurella Lindb.; M. Careyana Sulliv. ic. m.

Leaves very papillose coarsely dentate or fimbriate gen. much distant, broad-ovate abruptly acuminate. Capsule thick piriform; cilia sometimes short; lid obtuse. — Limestone rocks. *Eur.* r. Austria: Breidler, com. Warnstorf. *Amer.* less r. Can.: Macoun; Moser; Waghorne.

42. **Heterocladium** Bryol. eur.

A. Leaves distinctly dimorphous. Stem with paraphyllia.

a. Leaves smooth, r. mamillose at apex.

1.**H procurrens** Mitten. — Pterogonium Mitt.; Heterocladium Kindb.; Macoun Canad. musci n. 498; Hypnum, subg. Heterocladium, Lesq. et Jam.; Heterocladium aberrans Ren. et Card.

Leaves denticulate all around, not distinctly recurved, distant, spreading when dry; costa double. Stem-leaves from ovate base gradually tapering to a long filiform or subulate point, decurrent; alar cells suboval, apical and inner basal sublinear, the others oval-oblong. Branch-leaves ovate mostly obtusate sometimes short-acuminate or apiculate; cells suboval except the inner basal. Outer perichetial leaves suboblong with long narrow falcate acumen; inner much narrower, gradually subulate and nerveless with linear cells. Capsule inclined oval not curved (in Canadian specimens), sometimes (according to figures by Renauld and Cardot) suboblong oblique or faintly curved; teeth yellow; segments rimose; cilia short nodose; lid high convex with short point; pedicel smooth 1,5—3 centim. long. Stem pinnate. Tufts green very loose. Dioecious. — On wet rocks and base of trees in alp. regions; *Amer.* Western slope r. Can.: Macoun. U. S.: Roell, com. Cardot.

b. Leaves papillose; apical cells (at least on stem-leaves) narrow, also the inner basal.

2.**H.squarrosulum** Voit. — Hypnum Voit; Heterocladium Lindb.; Hypnum dimorphum Brid.; Heterocladium Br. eur.

Leaves denticulate all around, not recurved, pellucid; inner cells gen. rotundate; costa us. double. Stem-leaves from round-ovate decurrent base gen. long-acuminate, r. obtuse, us. spreading when dry. Branch-leaves broad-ovate obtusate or short-acuminate, often appressed when dry. Outer perichetial leaves nerveless with falcate acumen. Capsule inclined subovate or arcuate; teeth yellow; segments rimose; cilia long; lid subconic. Stem often subpinnate; branches obtuse. Dioecious r. fruiting. — Earth and rocks. *Eur.* not r. Sweden, Norway, Switzerl.; *Amer.* eastern distr. r. Can.: Moser; Waghorne.

3.**H.Austini** Sullivant. — Leskea Sull. ic. musc.; Heterocladium Kindb.

Leaves entire, slightly recurved below, ovate at base, not spreading when dry; costa simple faint sometimes prolonged to acumen. Stem-leaves short-acuminate; branch-leaves with longer, subulate acumen. Perichetial leaves with subfiliform point, inner erect. Capsule suboblong erect; lid obtuse; endostome unknown. Stem not pinnate. Monoecious. — Trees and stone walls r. *Amer.* U. S.: Austin, com. Macoun. — The figures by Sullivant not are exactly agreeing with typical specimens.

B. Leaves uniform papillose denticulate not recurved, not spreading when dry; upper cells short wide, alar not defined; costa not reaching above middle. Capsules unknown. Stem irregularly divided without paraphyllia. Dioecious.

4.**H.triste** Cesati. — Leskea Ces.; Heterocladium Kindb.; Anomodon Sullivant.

Leaves brittle from subovate base contracted to a sublinear obtuse acumen, denticulate all around, distant but not decurrent; cells round-hexagonal except some oblong near the simple costa. Tufts loose blackish green when dry. — Rocks and trees r. *Eur.* Italy, Switzerl.! *Amer.* U. S.: Austin, com. Macoun; James, com. Boswell.

5.**H.frullaniopsis** C. M. et Kindb. cat. Canad. m.

Leaves not brittle, round-oval obtusate cochleariform, minutely denticulate above middle, decurrent; upper cells rhombic, lower oblong; costa more or less distinct, sometimes stout and simple. Tufts dark green. — Trees r. *Amer.* Can. N. Brunsw.: Moser, com. Macoun.

43. **Pseudoleskeella** Kindb., new genus.

A. Leaves distinctly denticulate.

a. Leaves dimorphous; those of stem acuminate acute.

1.**P.heteroptera** Bruch. — Pterogonium Bruch; Heterocladium Br. eur.

Leaves opake very papillose, ovate-oblong serrulate all around, slightly recurved near base; cells gen. rotundate-quadrate. Stem-leaves gen. longer-acuminate; inner basal cells elongate; costa pellucid us. double. Branch-leaves subdistant often obtuse. Capsule small suboval sometimes erect; teeth pale, segments rimose as high; cilia long; lid obliquely rostrate; pedicel short. Stem r. subpinnate; branches attenuate or acute, fasciculate or distant, often flagellate. Dioecious very r. fruiting. — Rocks r. *Eur.* Sweden, Switzerl.! *Amer.* Pacif. distr. Can.: Macoun; Drummond n. 219. U. S.: Roell, com. Cardot.

2.**P.vancouveriensis** Kindb.; Thuidium bull. Torr. club XVII; Heterocladium cat. Canad. m.

Differs from the last: Leaves pellucid faintly papillose, below middle entire and often recurved; cells larger gen. more rotundate or suboval; costa of stem-leaves simple opake. Capsule sometimes horizontal; lid conic acuminate. Stem subpinnate; branches short r. flagellate. Monoecious. — Rocks r. *Amer.* Pacif. distr. Can.: Macoun. U. S.: Roell, com. Cardot.

3.**P.denticulata** Sullivant. — Leskea Sull. ic. m.; Hypnum fabroniæfolium C. M. syn.

Leaves pellucid faintly papillose minutely denticulate nearly all around; alar cells quadrate sometimes dilated, marginal rhombic, the others gen. suboblong; costa double very short or indistinct. Stem-leaves from round-ovate base abruptly long-acuminate; branch-leaves subovate short-acuminate concave faintly recurved below at one side. Capsule suboval suberect; teeth yellow scarcely higher than the rimose segments; cilia rudimentary or wanting; lid rostrate or rostellate; pedicel short. Tufts bright green. Branches somewhat compressed. Dioecious r. fruiting. — Base of trees r. *Amer.* U. S. middle and south. states: Austin, com. Macoun.

b. Leaves nearly uniform.

4.**P.occidentalis** Sullivant. — Hypnum Sull. icon. m.

Leaves pellucid nearly smooth obtusate obtuse subovate or ovate-oblong, denticulate above, faintly recurved at base; alar cells small quadrate. inner basal lanceolate, the others gen. rhombic-oval; costa often indistinct sometimes reaching to middle. Capsule suboval straight suberect or inclined oblong slightly curved; segments entire as high as teeth; cilia nodose shorter; lid conic rostellate; pedicel not long. Tufts green silky glossy. Stem irregularly branching or subbipinnate. Habit of *Pterygynandrum* in sterile state. — Base of trees r. *Amer.* Pacif. distr. Can.: Macoun. »U. S.: Hall»: Sullivant. — Not described in Lesq. et Jam. man.

5.**P.homalostegia** C. Mueller. — Hypnum C. M. in Flora 1873.

»Leaves faintly papillose obsoletely denticulate not recurved, from cordate base broad-ovate short-acuminate, suberect when moist; alar cells quadrate, the others narrowly elliptic; costa short double. Capsule subcylindric asymmetric horizontal; teeth red; segments yellow; cilia short; lid nearly flat with short point; pedicel not long. Tufts dusky green. Branches julaceous; stem creeping. Monoecious. — Bark of trees r. *Amer.* U. S. Alabama: Mohr»: C. M.

B. Leaves entire or at acumen indistinctly sinuolate, pellucid faintly papillose. Dioecious.

a. Leaves quite entire; cells rotundate exc. the alar.

6.**P.catenulata** Bridel. — Hypnum Brid.; Pseudoleskea Br. eur.

Leaves ovate or ovate-oblong acute or subobtuse sometimes short-acuminate, faintly recurved near base, crowded; costa vanishing near middle or shorter. Perichetial leaves suboblong acuminate costate. Capsule oblong arcuate; teeth yellow; segments rimose nearly as high; cilia shorter not appendiculate; lid rostellate. Tufts us. brownish or ferruginous. Stem creeping irregularly pinnate, us. rigid when dry. R. fruiting. — On rocks or r. at base of trees. *Eur.* not r. Switzerl. fruiting, Sweden, Norway!

* **P.laxifolia** Kindberg. — Pseudoleskea catenulata *laxifolia Kindb. revue bryol. 1892.

Leaves larger, green broad-ovate recurved to middle, somewhat distant; costa stronger. Capsules unknown. — Rocks r. *Eur.* Switzerl.!

7.**P.malacoclada** C. M. et Kindb. — Pseudoleskea cat. Can. m.

Leaves subulate-acuminate recurved near base; costa very short or indistinct. Stem-leaves from broad round ovate base abruptly narrowed; branch-leaves more gradually tapering. Perichetial leaves nerveless with patent or curved acumen. Capsules unknown. Stem sparingly radiculose not rigid. Tufts green or finally fuscescent. Habit of the last. — Dry rocks r. *Amer.* Can. Brit. Col.: Macoun.

8.**P.Wollei** Austin. — Leskea Aust.; L. cyrtophylla Kindb. cat. Can. m.

Leaves from broadly round-ovate base short-acuminate, recurved below; costa indistinct. Tufts dark-green or brown, nearly eradiculose. Capsules unknown. — Rocks r. *Amer.* Can.: Macoun.

b. Leaves often sinuolate above; cells more or less elongate.

9.**P.papillosa** Lindberg. — Leskea or Heterocladium Lindb.; Pseudoleskea Schimper.

Leaves very small broad-ovate gen. short-acuminate; costa sometimes forked; inner basal cells of stem-leaves elongate, the others gen. oval. Tufts dark green. Branches not flagellate. Capsules and flowers unknown. — Rocks r. *Eur.* Norway! Finl.: R. Hult. Sweden: E. Nyman.

44. **Pseudoleskea** Bryol. eur. in part.

I. **Eu-Pseudoleskea**. Leaf-cells gen. dilated, more or less papillose. Endostomial segments not split.

II. **Ptychodium**. Leaf cells narrow, us. smooth or faintly papillose. Endostomial segments not split.

1. Eu-Pseudoleskea.

A. Peristome orange or yellow. Terminal branch-leaves strongly papillose.

a. Leaves not squarrose, gen. crowded.

1.**P.atrovirens** Dickson. — Hypnum Dicks.; Pseudoleskea Br. eur.

Leaves from ovate-oblong base narrowed to a subulate serrulate gen. long acumen; inner cells us. rhombic-oval. Terminal branch-leaves with suboval apical cells. Perichetial leaves smooth subulate-acuminate nearly entire; costa short faint. Capsule oval-oblong gen. asymmetric; segments nearly as high as teeth, often split; cilia rudimentary or wanting; lid conic acute. Tufts not densely radiculose, us. brown with green branch-tops. Branches us. subpinnate with numerous branchlets. — Rocks princ. in alps. *Eur.* not r. Switzerl.! *Amer.* N. Foundl.: Waghorne. »Greenl.»: Lange.

* **P.filamentosa** Dickson. — Hypnum D.; Pseudoleskea Boulay.

Tufts us. green. Leaves less papillose; inner cells narrower. — Rocks. *Eur.* Norway, Switzerl.! Italy: Arcangeli.

* **P.tenella** Kindb. n. subsp.

Leaves smaller entire very papillose; cells rotundate. Capsules unknown. — *Amer.* r. Canada: Waghorne.

2.**P.ticinensis** Bottini. — »P. patens»: Limpricht.

Differs from *P. atrovirens*: Branches irregularly divided; terminal branch-leaves longer-acuminate, strongly papillose nearly all around. Capsule arcuate. — Alps r. *Eur.* Switzerl.: Bottini; Mari.

3.**P.brachyclados** Schwægrichen. — Leskea Schw.; Pseudoleskea Kindb.

Leaves ovate or ovate-oblong with short sublinear in upper part serrulate acumen; cells rhombic-oval or subquadrate. Perichetial leaves papillose subulate-acuminate denticulate; costa strong subpercurrent. Capsule obovate subsymmetric; segments split, nearly as high as teeth; cilia sometimes long and appendiculate; lid short obtuse. Tufts and branches as in *P. atrovirens.* R. fruiting. — Alp. rocks. *Eur.* not r. Norway, Switzerl.! Spain monte Maladetta! Austria: Venturi. France: Husnot.

* **P.borealis** Kindb. n. subsp.

Stem-leaves subovate broader; terminal branch-leaves more strongly papillose. Stem very radiculose. Capsules not found. — Rocks r. *Eur.* in northern districts also below alps. Norway! Sweden in Wermland: Miss O. Cron.

4.**P.patens** Lindberg. — Lesquereuxia Lindb.; Pseudoleskea Kindb. check-list of Eur. and N. Amer. mosses 1894; Limpricht 1895.

Differs from *P. brachyclados*: Leaves entire; costa shorter us. vanishing below acumen. Branches sparingly irregularly divided. Capsules unknown. — Rocks r. *Eur.* below alp. districts. Sweden: O. Nordstedt etc.

b. Leaves loosely disposed horizontally squarrose when moist.

5.**P.heterocladioides** Kindb. rev. bryol. 1895.

Leaves as in *P. atrovirens* but gen. entire, only those of branches slightly serrulate above. Perichetial leaves entire filiform-pointed nearly nerveless. Capsule asymmetric subobovate; segments rimose not split; cilia nodose; lid rostellate. Stem as in *P. atrovirens.* Tufts bright green. — Rocks r. *Eur.* Norway near Trondhjem: I. Hagen. — »*P. patens*» Limpricht.

B. Peristome pale. Leaves faintly papillose.

6.**P.falcicuspis** C. M. et Kindb. cat. Canad. m.

Leaves broadly ovate-lanceolate nearly entire, more or less acuminate; cells oval-oblong. Perichetial leaves abruptly narrowed to a somewhat short (subulate or subfiliform) often falcate acumen, entire and faintly papillose; costa faint. Capsule obovate subsymmetric; endostomial segments lower than teeth; pedicel short; cilia and lid not seen. Tufts sparingly radiculose green or olivaceous. Branches subjulaceous subpinnate; branchlets numerous. Corresponding to *P. brachyclados.* — Rocks in alp. region r. *Amer.* Pacif. distr. Can.: Macoun. U. S.: Roell.

7.**P.oligoclada** Kindb. bull. Tor. club XVII, 1890.

Leaves from broad-ovate base abruptly narrowed to a longer subulate nearly entire acumen, densely crowded not decurrent; uppermost cells narrow, the others round-quadrate very small with incrassate walls and not confluent. Perichetial leaves longer-acuminate. Tufts sparingly radiculose dark brown. Branches irregularly divided; branchlets few distant. Capsules unknown. — Rocks r. *Amer.* Pacif. distr. Can.: Macoun; Roell, com. Cardot.

II. Ptychodium Schimper in part.

A. Leaves somewhat large, often (also when dry) distinctly falcate, gen. smooth; costa not excurrent. Stem-leaves gen. entire. Habit of *Hypnum* (Cupressina) or *Brachythecium.*

8.**P.plicata** Schleicher. — Hypnum Schl.; Pseudoleskea Kindb.; Lesquereuxia Lindb.; Ptychodium Schimper.

Leaves large not or slightly decurrent, from ovate-oblong or ovate-lanceolate base long-acuminate subulate; upper cells linear, middle lanceolate or oblong-lanceolate. Branch-leaves us. denticulate near apex. Perichetial leaves acuminate often costate, inner with subulate acumen. Capsule suboblong us. finally arcuate; peristome orange or yellow; segments not lower, us. not rimose, their basal membrane nearly half as high; cilia rudimentary; lid short-conic obtuse or acute; pedicel 1—2 c. m. long. Tufts loose nearly eradiculose, brown at least below. Stems much ramose often subpinnate. R. fruiting. — On rocks or on ground in alp. woods gen. r. *Eur.* Switzerl. not r.! Sweden: Lindberg.

***P.rhætica** Kindb. n. subsp.

Leaves entire shorter and somewhat smaller, from subovate base less gradually attenuate and shorter acuminate, more appressed when dry. Outer perichetial leaves abruptly acuminate with short or indistinct costa, inner nerveless obtusate obtuse or short-pointed. Capsule erect symmetric; segments rimose. Tufts brown gen. eradiculose. — Alp. rocks r. *Eur.* Switzerl. near Churwalden in Graubuenden 1888!

9.**P.affinis** Limpricht. — Ptychodium Lpr.; Pseudoleskea Kindb.

Differs from *P. plicata*: »Leaves long-decurrent narrower and narrowly reflexed, those of branches costate to middle. Paraphyllia few. Capsules unknown. — Alp. rocks r. *Eur.* Austria: Breidler»: Limpricht.

10.**P.hyperborea** C. Mueller. — Ptychodium C. M. in litt.; Pseudoleskea Kindb.

Differs from *P. plicata*: Leaves shorter and broader, all entire; those of stem ovate short-acuminate, those of branches from ovate base long-acuminate or ovate-lanceolate. Branches simple julaceous. Capsules not seen. — Arctic district r. *Eur.* Norway near Nord-Cap 1892: W. Baur, com. C. Mueller.

11.**P.sciuroides** Kindb. bull. Tor. club XVII.

Leaves from ovate base narrowed to a shorter (subulate or filiform) nearly entire acumen, not decurrent; cells hyaline, only at insertion yellow, upper lanceolate, middle oblong-lanceolate. Perichetial leaves more attenuate to the subdenticulate acumen; costa none or indistinct. Capsule oblong suberect or inclined; peristome orange; teeth hyaline-bordered without distinct longitudinal line; segments scarcely lower; their basal membrane very low; cilia not appendiculate; pedicel 1,5 c. m. long; lid not seen. Tufts loose sparingly radiculose pale green. Branches few curved irregularly divided. — Rocks r. *Amer.* Can. Rocky mts: Macoun.

* **P.denudata** Kindb. (cat. Can. m. as var.) n. subsp.

Stems very long about 10 c. m., nearly simple, naked below without rhizoids. Capsules unknown. — Rocks in higher alp. region r. *Amer.* Can. Brit. Col.: Macoun.

B. Leaves not large, nearly appressed when dry, not or slightly curved, us. denticulate at acumen. Habit of *Lescuraea.*

a. Leaves distinctly papillose; costa sometimes excurrent.

12.**P.rigescens** Wilson. — Leskea Wils.; Pseudoleskea Lindb.; Hypnum radicosum Lesq. et Jam.

Leaves ovate-lanceolate or from broad base long-acuminate, often long-decurrent; upper cells sublinear, middle suboblong; costa not excurrent. Perichetial leaves abruptly filiform-pointed smooth nearly entire; costa short faint. Capsule narrowly oblong curved; peristome pale or pale yellow; cilia none; lid short obtuse; pedicel 1—2 c. m. long. Tufts green very radiculose. Branches subpinnate, branchlets numerous. — Trees and rocks. *Amer.* princ. in alp. regions of Pacif. distr., there corresponding to *P. atrovirens.* Alaska: J. M. Macoun. Can.: J. Macoun; Drummond n. 225. U. S.: Roell, com. Cardot.

13.**P.bicolor** Kindberg n. sp. (Lescuræa?).

Differs from the last: Leaves longer-acuminate, their middle cells sublanceolate. Costa of stem-leaves long-excurrent. Capsules unknown. Tufts sparingly radiculose, dark brown with green branch-tops. Stem irregularly divided. — Schistose alp. rocks r. *Eur.* Sweden in Lapland near lake Virijaur: E. Nyman 1893.

14.**P.atricha** Kindb. note on Can. bryol. 1893.

Leaves ovate-oblong short-acuminate; cells sublanceolate conflated irregularly sinuous; costa not excurrent. Capsules unknown. Tufts brownish or olivaceous with green branch-tops, loosely cohering without rhizoids. Branches subjulaceous irregularly divided; paraphyllia very few. — Rocks in higher alp. region r. *Amer.* Can. Pacif. distr.: Macoun.

b. Leaves gen. smooth and long-acuminate; costa not excurrent. Capsule gen. symmetric suberect; peristome golden yellow.

aa. Stem much divided. Endostomial segments broad rimose.

15.**P.decipiens** Limpricht. — Ptychodium Limpr.; Pseudoleskea Kindb.

Leaves gen. denticulate above; upper cells linear, middle lanceolate-oblong; costa vanishing below acumen. Stem-leaves from subovate-oblong base abruptly tapering; branch-leaves more gradually attenuate. Tufts green or yellowish Branches us. not curved. »Inner perichetial leaves gradually acuminate, denticulate nearly all around; costa short faint. Capsule suboval»: Limpricht. Confounded with *Lescuræa striata *saxicola*, princ. differing in endostome and narrower leaf-cells. — Stone in alp. region r. *Eur.* Norway, Switzerl.!

16.**P.Pfundtneri** Limpr. — Ptychodium Lpr., Pseudoleskea Kindb.

»Leaves gradually acuminate gen. entire; upper cells sublinear, the others rhomboidal or rhombic-hexagonal; costa subpercurrent. Stem-leaves from ovate-oblong base long-subulate; branch-leaves lanceolate. Perichetial leaves abruptly long-subulate; costa indistinct. Capsule broad-oval strangulate; pedicel 5—7 m. m. long. Tufts pale or yellowish green. — Stone in higher alp. region r. *Eur.* Austria, Germ., Switzerl.»: Limpricht.

bb. Stem nearly simple denudate below. Capsules unknown.

17. **P. Breidleri** Kindb. (new name). — Ptychodium oligocladum Limpricht 1895.

»Leaves from ovate base suddenly long-subulate gen. entire, pale or bright green; cells gen. sublanceolate; costa vanishing below acumen. — Rocks in higher alp. region r. — *Eur.* Salzburg: Breidler»: Limpricht.

45. Thuidium Bryol. eur.

A. Leaves crisped when dry, not recurved, more or less distant; cells gen. rotundate. Stem us. creeping; paraphyllia wanting. Pedicel of capsule short, sometimes rough.

I. **Claopodium**. Leaves denticulate; those of branches narrowly acuminate; cells round-oval or suboblong. Dioecious.

II. **Pseudo-Claopodium**. Leaves us. entire, broadly short-acuminate or obtusate, very small; those of branches us. obtuse; cells rotundate. Us. monoecious.

B. Leaves not (exc. *T. minutulum*) crisped, gen. appressed when dry, often recurved, us. crowded; cells sometimes elongate. Stem often not creeping; paraphyllia us. numerous. Pedicel smooth.

a. Leaves small. Tufts intricate. Stem us. creeping; paraphyllia short. Capsule small; pedicel us. not much long.

III. **Micro-Thuidium**. Leaves us. faintly papillose; cells gen. rotundate. Stem sometimes irregularly pinnate. Us. monoecious.

b. Stem-leaves gen. large. Tufts loose not intricate. Stem r. creeping; paraphyllia us. long. Capsule large; pedicel very long.

IV. **Eu-Thuidium**. Leaves us. very papillose; inner basal cells sublinear or oblong, the others gen. rotundate. Stem bi-or tripinnate; paraphyllia long. Dioecious r. fruiting.

V. **Elodium**. Leaves often faintly papillose or mamillose, sometimes smooth; cells often elongate, the middle gen. suboblong. Stem simply pinnate, not creeping; paraphyllia sometimes short. Monoecious or dioecious.

I. Claopodium Sullivant.

A. Leaves of stem and branches with long hyaline hairpoint. Stem often without rhizoids, pinnate or with pinnate branches.

1. **T. crispifolium** Hooker. — Hypnum Hook.; Thuidium Kindb.; Hypnum ramulosum Hampe.

Stem-leaves ovate-lanceolate or from short round-ovate base abruptly subulate; branch-leaves narrower; cells round-oval.

Perichetial leaves costate hyaline, pale yellow at base. Capsule suboval; teeth orange; segments split; cilia appendiculate; lid short-beaked; pedicel rough. — Rocks also in alp. region. *Amer.* Pacif. distr. Alaska: J. M. Macoun Can.: J. Macoun.

B. Leaves, at least those of branches, without distinct hair-point. Stem creeping subpinnate or bipinnate.

2.**T.leuconeuron** Sulliv. et Lesquer.; Sull. icon. muscor.

Leaves approached when moist, smaller than in the last; cells round-oval. Stem-leaves ovate-lanceolate subulate or broad-ovate obtuse with filiform point. Perichetial leaves nerveless. Capsule small suboval; teeth pale; segments split; cilia nodose; annulus large; lid with short thick often curved beak; pedicel smooth. Tufts green. — Trees and rocks r. *Amer.* Pacif. distr. r. Can.: Macoun. U. S.: Marshall A. Howe; Bolænder, com. C. Mueller.

3.**T.Whipplei** Sullivant. -- Hypnum Sull.; Thuidium Kindb.

Differs from the last: Leaves larger longer narrower and more distant; cells suboblong. »Pedicel of capsule rough; annulus none; perichetial leaves costate»: Lesq. et Jam. — Rocks r. *Amer.* Pacif. distr. Can.: Macoun.

II. Pseudo-Claopodium Kindb.

4.**T.laxifolium** Schwægrichen. — Hypnum Schw.; Thuidium Kindb.

»Leaves denticulate. Stem-leaves from ovate base short-acuminate; branch-leaves ovate. Capsule globose-ovate; cilia short; lid obliquely rostellate; pedicel rough. — Earth r. *Amer.* Northwest coast: Menzies»: C. M. syn.

5.**T.pseudo-pygmæum** Kindb. (new name). -- Hypnum pygmæum Schimper, non Taylor; Sulliv. icon. muscor.; H. remotifolium Greville?

Leaves entire opake short-acuminate very small; those of stem ovate-oblong, those of branches somewhat longer; costa often excurrent. Capsule very small suboval; cilia short; lid rostrate; pedicel smooth. Stem pinnate or bipinnate. — Wet rocks r. *Amer.* U. S.: Austin, com. Macoun

III. Micro-Thuidium Kindb. (in check-list).

A. Leaves crisped when dry; cells rotundate. Paraphyllia numerous. Monoecious.

6.**T.minutulum** Hedwig. — Hypnum H.; Thuidium Br. eur.

Leaves entire subovate opake; costa not excurrent. Stem-leaves us. short-acuminate; branch-leaves obtuse shorter; costa faint. Capsule small suboblong horizontal; cilia long; lid long-rostrate; pedicel short. Stem pinnate or bipinnate. — Rocks and trees. *Eur*. r. Germany: Schimper. *Amer*. Can.: Macoun; Moser.

B. Leaves not crisped; inner cells gen. round-oval. Stem often pinnate; paraphyllia us. numerous. Monoecious.

7.**T.virginianum** Bridel. — Hypnum Brid. 1827; Thuidium Lindb.; Hypnum punctulatum Notaris 1834; Thuidium Not. 1863.

Leaves denticulate often opake; costa vanishing in acumen or subexcurrent. Stem-leaves from round-ovate or ovate-oblong base abruptly long-acuminate, less distinctly denticulate; branch-leaves ovate oblong shorter-acuminate. Capsule red-brown us. arcuate strangulate; lid conic or convex, rostellate or apiculate; cilia long often appendiculate; pedicel long. Tufts green or brown-green. — Logs and stone in woods. *Eur*. r. Switzerl.! Austria: Barth, com. Levier. *Amer*. Can. r.: Macoun.

* **T.gracile** Bruch et Schimper. — Hypnum B. S. 1843; Sull. icon. musc.; Thuidium Br. eur.

Leaves gen. less opake. Capsule us. red; lid subobtuse short-apiculate. — *Amer*. not r. in eastern distr. Can.: Macoun; Moser. U. S.: Langlois, com. Cardot.

* **T.pallens** Lindberg. — T. lignicola Kindb. in Ottawa Natur. IV.

Leaves more distinctly serrulate. Capsule pale; lid subobtuse short-apiculate. — Logs r. *Eur*. Sweden near Stockholm: Lindberg. *Amer*. Can.: Macoun.

8.**T.scitum** Beauvois. — Hypnum B.; Thuidium Austin.

Leaves entire, more or less opake but with shorter papillæ than in the last; costa us. vanishing below acumen. Stem-leaves from round-ovate base abruptly acuminate; branch-leaves ovate subobtuse. Capsule brown us. faintly curved not strangulate; lid narrowly conic; cilia short not appendiculate; pedicel long. Tufts dark green. — Base of trees. *Amer*. not r. Can.: Macoun.

9.**T.pseudo-gracile** Kindb. n. sp.

Differs from *T. virginianum*: Leaves of stem broader, from very broad base more abruptly narrowed to the often falcate and gen. not long acumen, entire nearly smooth; branch-leaves entire or faintly denticulate. Capsules unknown. — Differs also from *T. scitum*: Leaves larger and broader; costa percurrent or excurrent. Stem-leaves shorter and more broadly revolute; branch-leaves ovate-oblong acuminate acute. — Logs r. *Amer*. Can. near Leamington: Macoun.

C. Leaves not crisped; inner cells gen. suboblong. Stem irregularly divided; paraphyllia few.

10.**T.pulchellum** Notaris. — Amblystegium gracile Juratzka; Pseudoleskea Schimper.

Leaves entire long-acuminate recurved below, faintly papillose; cells gen. suboblong; costa often percurrent. Stem-leaves from round-ovate base abruptly narrowed; branch-leaves ovate oblong or ovate-lanceolate more gradually narrowed, indistinctly sinuolate above. Perichetial leaves with long filiform point. Capsule oblong arcuate; segments and cilia short; lid conic obtuse. Tufts green, ferruginous below. Monoecious. — Resembling *Pseudoleskeella catenulata* and *Anomodon nervosus* in habit but easily distinct in narrower leaf-cells. — Rocks r. *Eur.* Switzerl.: Schimper.

11.**T.algarvicum** Schimper. — Leskea Sch.; Thuidium Kindb.; T. Solmsii C. M. in herb.

Leaves denticulate not recurved, very papillose; middle cells suboblong, upper and lower narrower; costa percurrent. Stem-leaves from ,ovate-oblong base long-acuminate; branch-leaves narrower, more distinctly serrulate all around. Capsules unknown. Dioecious. — *Eur.* r. Portugal: Solms-Laubach, com. C. Mueller.

IV. Eu-Thuidium.

A. Leaves acute very papillose; inner basal cells linear-lanceolate. Stem-leaves from broad-ovate base gen. long-acuminate; branch-leaves denticulate very short-acuminate; costa short.

a. Apical cell of branch-leaves narrow acute smooth. Perichetial leaves very papillose, fimbriate or long-ciliate.

12.**T.tamariscinum** Hedwig. — Hypnum H.; Thuidium Br. eur.

Leaves of stem faintly recurved. Lid of capsule apiculate or rostellate. Stem not creeping, us. tripinnate. — Earth and stone in woods. *Eur.* not r. Sweden, Switzerl., Germany!

b. Apical cell of branch-leaves broad bifid. Perichetial leaves smooth or sparingly papillose with few or none cilia and denticulate acumen.

13.**T.delicatulum** L. — Hypnum L.; Thuidium Mitten.

Stem-leaves recurved not long-acuminate, gen. entire. Perichetial leaves sparingly papillose sometimes with a few cilia. Capsule rostrate. Stem not creeping, us. bipinnate. — Earth and stone in woods. *Eur.* r. Sweden! *Amer.* not r. Can.: Macoun. U. S.: Wetherby; Langlois, com. Cardot.

14.**T.Philiberti** Limpricht 1895. — T. recognitum var. radicans Kindb. revue bryol. 1892; T. intermedium Philibert 1893; T. pseudo-tamarisci Limpricht 1895.

Differs from the last: Stems creeping, often tripinnate and densely tufted. Stem-leaves larger and long-subulate. Perichetial leaves smooth without cilia. Tufts dark green. Plants gen. smaller. — Earth and rocks r. *Eur.* Switzerl. near Lugano and Faido! *Amer.* »U. S.»: Best.

15.**T.recognitum** Hedwig. — Hypnum H.; Thuidium Lindb.

Stem-leaves gen. not recurved and not long-acuminate, us. denticulate. Perichetial leaves smooth without cilia. Capsule apiculate. Stem not creeping or with few rhizoids at base, us. bipinnate. — Stone and earth in woods. *Eur.* nearly common below alp. regions. Sweden, Germany, Switzerl., France! *Amer.* less common. Can.: Macoun.

B. Leaves obtuse faintly papillose; those of stem broad-ovate short-acuminate; inner basal cells oblong; branch-leaves obtusate nearly entire; costa long.

16.**T.Alleni** Austin.

Leaves not reourved, those of stem entire; cells gen. rotundate, the apical one round-oval not bifid. Stem bipinnate not creeping. Capsules unknown. — Peat-bogs r. *Amer.* U. S: Allen, com. Macoun.

V. Elodium Sullivant et Lesquereux.

A. Stem tomentose; paraphyllia long. Leaves large gen. faintly mamillose; those of stem pellucid; cells gen. oblong-lanceolate. Capsule arcuate. Monoecious often fruiting.

a. All leaves mamillose; those of branches not pellucid.

17.**T.Blandowii** Weber et Mohr. — Hypnum W. M.; Thuidium Br. eur.

Leaves from broad-ovate base long-acuminate, faintly denticulate all around; cells elongate gen. oblong-lanceolate, the basal pale. Lid of capsule rostellate. Stem erect pale-tomentose; branches crowded us. elongate attenuate. — Peat-swamps and wet meadows princ. in northern districts. *Eur.* Sweden and Norway not r.! *Amer.* r. Can.: Macoun; White; Waghorne U. S.: Roell, com. Cardot.

18.**T.pseud-abietinum** Kindb. note on Canad. bryol. 1893. — T. elodioides Renauld et Cardot in Hedwigia 1893.

Leaves orange at insertion; middle cells oval-oblong. Stem-leaves ovate short-acuminate faintly denticulate above. Branch-leaves ovate-oval subobtuse more distinctly denticulate, very opake and mamillose or papillose on both sides. Stem brown-tomentose; branches short distant. Lid of capsule not seen. — Woods r. *Amer.* Can.: Macoun; Waghorne. U. S.: Roell.

b. All leaves pellucid; those of stem smooth.

19.**T.paludosum** Sullivant. — Hypnum Sull. ic. musc.; Thuidium Kindb.

Leaves orange at insertion; cells oblong-lanceolate. Stem-leaves recurved ovate-lanceolate gradually long-acuminate, faintly denticulate above. Branch-leaves ovate-oblong shorter-acuminate faintly denticulate, slightly mamillose at back. Stem and branches as in the last. — Peat-bogs r. *Amer.* Can.: Macoun; White. U. S.: Austin, com. Macoun; Roell, com. Cardot.

B. Stem not tomentose; paraphyllia short. Leaves opake very papillose us. not large; cells gen. suboval. Capsule faintly curved. Dioecious r. fruiting.

20.**T.abietinum** L. — Hypnum L.; Thuidium Br. eur.

Leaves brownish at insertion, appressed when dry, gen. not recurved. Stem-leaves from ovate base abruptly short-acuminate, entire or indistinctly crenulate. Branch-leaves subovate denticulate. Branches us. distant and brown-green. — Dry earth and stones r. in wet places. *Eur.* common. Sweden fruiting, Norway, Germany, Switzerl.! *Amer.* not r. Can.: Macoun.

* **T.hystricosum** Mitten; Braithwaite.

Leaves larger, less appressed when dry us. green; cells often suboblong. Capsules unknown. — Calcareous princ. wet hills r. *Eur.* Switzerl. near Freiburg 1855!

* **T.pachycladon** Kindb. note on Canad. bryol. 1893.

Leaves large, orange at insertion; those of stem ovate-lanceolate gradually long-acuminate; cells princ. the uppermost suboblong. Branches green crowded. Habit of *T. Blandowii.* Capsules unknown. — Wet places r. *Amer.* Can. Rocky mts: Macoun.

Fam. 13. Hypnaceæ.

46. Pylaisia Bryol. eur.

1.**Intricatæ.** Endostomial segments cohering to above middle with teeth. Branches julaceous often curved. Tufts very intricate green or dark green. Leaves entire, those of stem decurrent; alar cells small green very numerous. Capsule oblong or oval; teeth yellow. Spores large.

2.**Polyanthoideæ.** Endostome not cohering with teeth. Branches gen. not julaceous. Tufts less intricate. Leaves not distinctly decurrent, often denticulate; alar cells less numerous. Capsule often subcylindric; teeth often pale. Spores gen. small.

1. Intricatæ.

A. Leaves with ovate-lanceolate base; cells narrow sublanceolate. **Capsule oblong.**

1.**P.intricata** Hedwig. — Pterigynandrum H.; Pylaisia Schimper; Sulliv. icon. m.

Leaves long-acuminate us. faintly recurved; perichetial sublinear-lanceolate not plicate, the inner with short subulate point. Lid of capsule with short oblique beak. Branches crowded. Tufts green. — Trees and logs. *Amer.* not r. Can.: Macoun. U. S.: Sullivant, com. C. Mueller. *Eur.* r. »Russia near river Svir»: Elfving.

2.**P.ontariensis** C. M. et Kindb. cat. Canad. m.

Differs from the last: Leaves more recurved and shorter acuminate; perichetial plicate ovate-oblong short-acuminate or obtusate. Peristomial teeth broader; lid obtuse. Branches less crowded. Tufts often dark green. — Trees. *Amer.* Can. eastern distr. not r: Macoun; Moser.

B. Leaves with short base; cells dilated.

3.**P.Selwyni** Kindb. in Ottawa Naturalist II.

Leaves subovate us. recurved to the short acumen; cells gen. suboblong. Perichetial leaves not plicate, ovate oblong long-acuminate often filiform-pointed. Capsule broad-oval; lid obtuse. Branches crowded. Tufts dark green or brown. — Trees r. *Amer.* Can.: Macoun; Dearness and White. U. S.: Roell.

4.**P.cyrtophylla** Kindb. n. sp.

Leaves broad-ovate gen. obtusate obtuse, not or slightly recurved; cells oval, larger than in the 3 last species. Branches crowded. Tufts green. Capsules unknown. Old logs r. *Amer.* Can. Peace river: Macoun 1872.

2. Polyanthoideæ.

A. Leaves distinctly denticulate.

5.**P.heteromalla** Bruch et Schimper.

Leaves larger than in *P. polyanthos*; inner basal cells (at insertion) suboval not yellow, the others linear-lanceolate exc. the alar. Stem-leaves ovate-oblong filiform-pointed not recurved; branch-leaves shortly acuminate-subulate. Capsule oval-oblong; teeth dark yellow; cilia none; lid subobtuse. Branches us. curved and yellowish. — Trees and stones r. *Amer.* Can.: Macoun.

6.**P.pseudo-platygyrium** Kindb. cat. Canad. m.

Leaves ovate-lanceolate long-acuminate filiform-pointed, often recurved to acumen; inner basal and alar cells orange, the others sublinear. Capsule subcylindric pale with dark red border at mouth; peristome pale; segments widely open in middle, basal membrane low; lid short-pointed. Tufts brown-green. — Logs r. *Amer.* Can.: Macoun. U. S.: Roell.

7.**P.filari-acuminata** C. M. et Kindb. cat. Can. m.

Leaves as in the last but smaller; inner basal pale, the others sublinear exc. the alar. Capsule subcylindric brick-red; teeth yellow; segments rimose or narrowly open in middle, basal membrane elevate; lid conic obtuse. Tufts bright green. — Trees r. *Amer.* Can. Rocky mts: Macoun.

B. Leaves entire or the uppermost faintly sinuolate.

a. Stem-leaves recurved to the middle of basal borders; alar cells about 15—20. Stem creeping, sometimes with paraphyllia. Tufts green us. silky glossy.

8.**P.polyanthos** Schreber. — Hypnum Schr.; Pylaisia Br. eur.

Stem-leaves ovate-oblong filiform-pointed, yellow at insertion; cells sublinear-lanceolate exc. the alar. Branch-leaves ovate-lanceolate with subsubulate acumen or short filiform point, gen. not recurved. Perichetial leaves filiform-pointed. Capsule suboblong or subcylindric, contracted at mouth; teeth pale yellow; segments split; cilia rudimentary or wanting; lid short-pointed. Stem pinnate. Tufts green. — On trees, r. on rocks or roofs. *Eur.* common. Sweden, Germany, Switzerl., Italy! *Amer.* Can. not r.: Macoun.

b. Leaves not or near base recurved, entire; alar cells few not well defined. Stem not creeping. Tufts not or faintly glossy.

9.**P.suecica** Br. eur. — Thedenia Br. eur.; Pylaiea Lindberg.

Leaves small ovate-oblong or ovate-lanceolate, often long-acuminate; lower cells suboblong, middle rhombic-oval. Perichetial leaves apiculate. Capsule oblong-cylindric; teeth yellow; cilia short; lid rostrate. Stem irregularly divided or subpinnate; branches julaceous. Tufts green with few rhizoids. — Earth in subalp. region r. *Eur.* Sweden: K. F. Thedenius.

* **P.alpina** Kindb. n. subsp. — Hypnum polyanthos var. alpinum Kindb. Laubm. Schwed. u. Norw.

Leaves a little larger, less strongly appressed when dry; perichetial submuticous. Capsule narrow-cylindric; lid rostellate. Branches subfastigiate nearly simple. Tufts eradiculose yellowish green. — *Eur.* Norway near Kongsvold on a turf-roof in subalp. region!; E. Adlerz.

10.**P.alpicola** Lindberg. — Stereodon (Pylaiea) Lindb.; Arnell musci Asiæ bor.; Pylaisia Kindb. check-list of Eur. and N. Am. Bryin.

Leaves ovate-oblong with long filiform falcate point, very small and not appressed; alar cells yellow, the others pale sublinear. Plants bright green, sparingly radiculose. — Capsules unknown. — Stones in alp. region r. *Eur.* Sweden in Lapland: E. Nyman.

47. Pylaisiella Kindberg, new genus.

1.**P.velutina** Schimper. — Pylaisia Sch.; Sull. icon. m., in part.

Leaves entire from ovate-oblong base acuminate, recurved to acumen, subdecurrent; upper cells, also the middle marginal, rhomboidal; inner cells sublinear-lanceolate, inner basal narrow orange; angular cells diversiform, special alar few large inflated brown or hyaline, inner angular small green numerous. Perichetial leaves plicate serrulate. Capsule large cylindric not contracted at mouth; teeth orange; segments split in two densely dentate legs, basal membrane very low; cilia none; pedicel long. Spores large. Branches not julaceous. Tufts green or brown-yellow. — Trees. *Amer.* Can. Macoun; Moser.

In the cited Sull. icon. m. leaves are longer acuminate, their alar cells not delineated, endostomial segments adhering in their whole length to the teeth.

2.**P.subdenticulata** Schimper. — Pylaisia Sch.; Sull. ic. m.

Leaves small ovate-lanceolate long-acuminate minutely denticulate at acumen, faintly recurved below, not decurrent; angular cells small green, the others sublinear. Perichetial leaves as in the last. Capsule small oblong-cylindric not contracted; teeth yellow; segments split, basal membrane elevate; cilia long subappendiculate; pedicel short. Spores small. Branches not julaceous. Tufts pale green or yellowish. Smaller than *Pylaisia polyanthos.* — Trees r. *Amer.* Can.: Waghorne. U. S.: Austin, com. Macoun.

48. Raphidostegium Notaris.

A. Capsule oblique or curved. Leaves entire below.

I. **Eu-Raphidostegium.** Branches not or faintly compressed. Leaves plurifarious us. small and crowded.

II. **Pseudo-Plagiothecium.** Branches complanate. Leaves subdistichous not densely crowded, sometimes large.

B. Capsule straight erect. Leaves denticulate all around.

III. **Pseudo-Pylaisia.** Branches not or faintly compressed. Leaves small not densely crowded.

I. Eu-Raphidostegium.

A. Leaves curved (incurved or subfalcate), distinctly denticulate above, with ovate-oblong base and short acumen, crowded. Stem creeping; branches crowded faintly compressed.

1.**R.recurvans** Michaux. — Leskea Mich; Raphidostegium Sauerbeck et Jæger: Hypnum Schwægr.; Sull. icon. musc.

Leaves recurved gen. to middle, denticulate above it, with long filiform serrate point; alar cells orange. Perichetial leaves gradually long-acuminate, serrate only at the short point. Capsule suboblong curved; teeth orange; segments entire; beak long; pedicel us. somewhat long. Stem red. Tufts yellowish green. Dioecious but often fruiting. — Trees and logs. *Amer.* Can.: Macoun; White; Moser; Waghorne.

2.**R.Whitei** Kindb. n. sp.

Leaves faintly or not recurved, gen. entire below acumen, with serrate filiform or subulate point; alar cells hyaline. Perichetial leaves dentate at the long acumen. Capsule suboval curved or oblique; teeth pale; segments entire; beak not long; pedicel short. Stem pale or pale red. Tufts green. Monoecious. — Trees r. *Amer.* Can. Ont. near Edmonton 1892: J. White, com. Macoun.

B. Leaves not distinctly curved, gen. quite entire and small. Monoecious or (*R. subdemissum*) dioecious.

a. Branches not julaceous. Stem radiculose. Leaves recurved.

3.**R.demissum** Wilson. — Hypnum Wils.; Raphidostegium Notaris.

Leaves ovate-oblong acute sometimes short-acuminate, r. filiform-pointed, gen. entire and recurved all around; alar cells rotundate not large, upper lanceolate, the others linear. Perichetial leaves subulate-acuminate. Capsule very small suboval strangulate often arcuate; neck not distinct; teeth yellow, orange below; segments yellow; pedicel short. Tufts green or brown-green sparingly radiculose. — Wet rocks. *Eur.* r. Switzerl.! Engl.: Cunliffe Germany: Schimper; Boulay. *Amer.* less r. Can.: Macoun; Moser; Waghorne. U. S: com. Macoun.

4.**R.Welwitschii** Schimper. — Rhynchostegium Sch.; Raphidostegium Sauerbeck et Jæger.

Differs from the last: Tufts compact bright or yellowish green silky glossy and velvet-like. Leaves ovate-oblong or ovate-lanceolate, long acuminate often filiform-pointed; alar cells larger. Peristome paler. Perichetial leaves filiform-pointed. — Trunks of *Olea* and *Quercus* r. *Eur.* Italy: Bottini; Arcangeli.

5 **R.microcarpum** Bridel. — Leskea Brid.; Raphidostegium Sauerbeck et Jæger; Hypnum C. M.; Sulliv. ic. musc.

Differs from *R. demissum*: Leaves gen. acuminate, sometimes faintly sinuolate. Capsule not strangulate r. arcuate; neck more or less distinct; teeth yellowish; segments hyaline; pedicel very short. Tufts green or yellowish. — Trees r. *Amer.* U. S. south. states: Mohr, com. Macoun; Langlois and Sawyer, com. Cardot.

***R.admixtum** Sullivant. — Hypnum Sull.; Raphidostegium Kindb.

Capsule arcuate more distinctly necked; pedicel longer. — Trees r. *Amer.* »U. S.» Lesq. et Jam. (Cuba: Wright, herb. Sulliv., com. C. Mueller).

b. Branches julaceous. Stem not radiculose. Leaves entire, not or slightly recurved.

6.**R.subdemissum** Kindb cat. Canad. m.

Leaves small ovate-lanceolate long-subulate; alar cells large, the others linear. Capsules unknown. Branches distant cuspidate yellowish green. Dioecious. — Rocks in arctic Pacif. distr. r. *Amer.* Alaska: J. M. Macoun.

7.**R.marylandicum** C. Mueller. — Hypnum demissum var. Lq. et J.

Leaves ovate-lanceolate subobtuse acute somewhat large; alar somewhat large, the others linear. Perichetial leaves subulate-acuminate. Capsule subobovate or oblong without neck, not strangulate, larger than in *R. demissum*; endostome yellow. Tufts olivaceous with green branch-tops. Plants robust. Monoecious. — Wet rocks r. *Amer.* U. S.: Sull. et Lesq. musci bor. amer. n. 442, com. C. Mueller.

II. Pseudo-Plagiothecium Kindb.

A. Leaves curved, distinctly denticulate above, from ovate-oblong base narrowed to acumen. Us. dioecious.

8.**R.laxepatulum** Lesquereux et James. — Hypnum (Raphidostegium) L. et J.; Raphidostegium Kindb.; Rhynchostegium delicatulum James; Sulliv. icon. m.

Leaves with somewhat long subsubulate dentate acumen; perichetial strongly dentate above to below middle. Capsule suboblong curved; teeth pale, papillose above; segments entire; cilia none; pedicel very short. Stem pale or greenish red, sparingly radiculose; branches distant. Tufts green. Habit of *Plagiothecium silvaticum.* Dioecious. — *Amer.* r. U. S.: Purpus, com. Roell.

9.**R.Lorentzii** Molendo. — Hypnum M.; Raphidostegium Kindb.

Leaves with more or less long gen. subulate denticulate acumen; perichetial denticulate above. Capsule oblong slightly curved; teeth golden yellow, papillose above; segments rimose; cilia long; pedicel not long. Stem red sparingly radiculose;

branches distant. Tufts bright or yellowish green. Dioecious. — Clayey ground or stones in subalp. region r. *Eur.* Germany: P. G. Lorentz.

10.**R.Roellii** Renauld et Cardot.

Leaves with short serrate often twisted point, small; perichetial dentate at acumen. Capsule oblong often curved; teeth pale yellow, papillose above; segments rimose or entire; cilia often long; lid rostrate; pedicel not long. Stem red sparingly radiculose; branches distant. Tufts bright green. Monoecious. — Logs r. *Amer.* Pacif. distr. Can.: Macoun. U. S.: Roell.

B. Leaves not distinctly curved, gen. quite entire.

a. Leaves subulate-acuminate.

11.**R.expallens** C. M. et Kindb. — Entodon cat. Canad. m.

Leaves large ovate-lanceolate or ovate-oblong with not long, sometimes faintly denticulate and at apex often deflexed acumen, not or indistinctly recurved; upper cells linear, alar large. Capsules unknown. Resembles *Brachythecium rivulare.* Dioecious. — Bogs by springs r. *Amer.* Can.: Macoun. U. S.: James, com. C. Mueller.

12.**R.carolinianum** C. Mueller. — Hypnum C. M. syn.

»Leaves narrowly ovate-lanceolate acuminate, recurved all around; perichetial entire. Capsule small obovate inclined. Branches compressed somewhat long and flaccid, dusky yellowish; stem long. Monoecious. — Wet rocks r. *Amer.* U. S.: Sullivant»: C. M.

b. Leaves obtusate (obtuse or acute).

13.**R.Kegelii** C. Mueller. — Leskea C. M.; Raphidostegium Renauld et Cardot; Hypnum C. M. syn.

Leaves small ovate more or less recurved; upper cells rhombic-oblong, lower lanceolate, alar small. Capsule narrowly cylindric subarcuate; pedicel somewhat long. Tufts dirty green. Monoecious. »Peristomial teeth short yellow»: C. M. syn. — Trees r. *Amer.* U. S.: Langlois, com. Cardot.

III. Pseudo-Pylaisia Kindb.

14.**R.cylindricarpum** C. Mueller. — Hypnum C. M.; Sulliv. ic. m.

Leaves ovate-lanceolate curved, recurved below and (as the perichetial) serrate at acumen; alar cells large hyaline, the others linear. Capsule cylindric; teeth yellow; segments rimose; pedicel somewhat long. Tufts intricate us. brown-green or faintly glossy. Dioecious. — Logs in woods r. *Amer.* U. S.: Sullivant, com. C. Mueller; Purpus, com. Roell; Peck, herb. Austin, com. Macoun.

49. Rhynchostegium Bryol. eur.

I. **Eu-Rhynchostegium**. Stem with broad paraphyllia. Leaves nearly flat; costa short double or indistinct. Dioecious or monoecious.

II. **Pseud-Eurhynchium**. Leaves often concave; costa gen. simple or in some leaves indistinct. Often monoecious. Paraphyllia us. wanting, in *R. serrulatum* sometimes present.

I. Eu-Rhynchostegium.

A. Leaves more or less distant, not decurrent; alar cells not large or not well-defined. R. fruiting.

1.**R.depressum** Bruch.

Leaves narrowly ovate-oblong acute sometimes short-acuminate, serrulate above, nearly entire below; upper cells oval-oblong, middle oblong-lanceolate. Capsule suboval or arcuate strangulate; annulus double; lid rostrate; pedicel short. Stem creeping. Tufts glossy green. Dioecious. — Shady rocks. *Eur.* not common. Sweden, Germany, Switzerl.!

2.**R.geophilum** Austin; Sullivant icon. muscor.

Differs from the last: Leaves somewhat larger and more distant, subobtusate, denticulate below; uppermost cells oval, lower lanceolate. Capsule not strangulate; annulus simple. Branches longer; stem nearly eradiculose. — Clayey shaded ground r. *Amer.* U. S.: Austin, com. Macoun.

3.**R.deplanatum** Schimper. — Hypnum Sch.; Sulliv. ic. m.; Rhynchostegium Kindb.; Hypnum (Rhynchostegium) Lq. et J.

Leaves ovate oblong acute with short or more prolonged subulate acumen, serrulate above, minutely denticulate or nearly entire below, cells gen. linear-lanceolate, lower sometimes suboblong; costa often obsolete, sometimes double. Perichetial leaves with dentate long-subulate acumen. Capsule oval-oblong or arcuate, strangulate wide-mouthed plicate when dry; segments entire; lid rostrate, rostellate or obtuse; annulus none; pedicel often short. Stem depressed creeping; paraphyllia us. dentate. Tufts dense glossy green. Us. monoecious. Leaves often crowded. — On rocks or on base of trees. *Amer.* Can.: Macoun; Moser. — Male flowers not found by Sullivant.

4.**R.caloosiense** Austin. — Hypnum Austin.

»Differs from the last in short pointed entire leaves and much longer entire paraphyllia. — Leaves broadly obliquely ovate subacuminate; areolation loose rhomboidal fusiform; costa geminate distinct to near middle. Capsule broadly oval much constricted; pedicel short. Monoecious. — *Amer.* r. U. S.: J. D. Smith, Austin»: Lesq. et Jam.

B. Leaves crowded decurrent; alar cells large hyaline. Lid of capsule long-conic acute or short conic rostellate.

5.**R.membranosum** Kindb. — Plagiothecium cat. Can. m.

Leaves flat ovate-oblong acute or short-acuminate, entire or above middle denticulate, patent or spreading; cells linear exc. the alar. Capsule cylindric or obovate arcuate, not constricted; teeth yellow; pedicel not long. Tufts dense glossy green, not or sparingly radiculose. Dioecious. — Logs in swamps r. *Amer.* Can.: Macoun; White.

II. Pseud-Eurhynchium Kindb.

A. Leaves crisped when dry; cells much dilated.

6.**R.rotundifolium** Scopoli. — Hypnum Scop.; Rhynchostegium Br. eur.

Leaves somewhat distant, not decurrent; costa vanishing near middle. Stem-leaves ovate gradually short-acuminate, nearly entire; cells suboblong, alar not defined. Branch-leaves shorter, broad-ovate abruptly short-acuminate, minutely denticulate all around; cells oval. Capsule suboval not large; lid rostrate; pedicel short smooth. Stem creeping. Tufts green. Monoecious. — Stones r. *Eur.* south. districts. Switzerl., Italy!

B. Leaves not crisped; cells gen. narrow.

a. Leaves distant; alar cells large. Lid of capsule not rostrate.

7.**R.revelstokense** Kindb. — Eurhynchium note on Can. bryol.

Leaves ovate-lanceolate long-subulate denticulate plicate and pellucid, sometimes short-decurrent; cells lanceolate exc. the alar; costa somewhat thick, vanishing above middle or shorter. Capsule arcuate; lid rostellate; pedicel short smooth. Stem creeping subpinnate or irregularly divided. Tufts pale or light green. Male flowers not found. — Logs r. *Amer.* Can. Brit. Col.: Macoun; N. Foundl.: Waghorne.

8.**R.pseudo-serrulatum** Kindb. — Eurhynchium Kindb. l. c.

Leaves ovate or ovate-oblong, minutely denticulate, striate and chlorophyllose, not or indistinctly decurrent; cells lanceolate, the lower shorter and more dilated; costa thin vanishing above middle. Stem-leaves with short-acuminate or filiform-pointed; branch-leaves with short subulate sometimes twisted point. Capsule arcuate; lid apiculate; pedicel rough very long. Stem subpinnate or irregularly divided. Tufts dark green, faintly glossy, radiculose at base. Monoecious. Habit of *R. serrulatum*. — Earth and stones in woods r. *Amer.* Can.: Macoun; Moser; Waghorne. U. S. New Jersey: com. Macoun.

b. Leaves gen. distant; alar cells not large.

aa. Leaves serrulate or serrate, gen. large; costa simple us. long.

9.**R.serrulatum** Hedwig. — Hypnum H.; Sullivant ic. m.; Rhynchostegium Kindb.; Hypnum (Rhynchostegium) Lq. et Jam.

Leaves serrulate pellucid neither striate nor decurrent; cells sublinear exc. the sometimes not well-defined alar; costa thin often reaching above middle. Stem-leaves filiform-pointed us. ovate-oblong; branch-leaves broadly ovate-lanceolate with short sublinear twisted point. Capsule arcuate; segments entire; annulus broad; lid rostrate; pedicel smooth us. long. Stem pinnate creeping, r. with paraphyllia. Tufts pale green. Monoecious. — On ground in dry woods. *Amer.* not r. Can.: Macoun. U. S.: Roell; Sullivant, com. C. Mueller; Fitzgerald, com. Renauld.

* **R.eriense** Kindb. — Eurhynchium note on Can. bryol.

Leaves subovate nearly crowded, shorter and less distant; alar cells more distinct. Capsule smaller; pedicel short. — *Amer.* Can.: Macoun. U. S.: Roell.

* **R.hispidifolium** Kindb. — Eurhynchium Kindb. l. c.

Branches longer. Leaves very long, ovate-lanceolate long-acuminate sharply serrate. Capsules und flowers unknown. — *Amer.* r. Can. Brit. Col.: Macoun.

bb. Leaves entire or near apex minutely denticulate.

10.**R subintegrifolium** Kindb. — Eurhynchium Kindb. l. c.

Leaves decurrent chlorophyllose ovate-oblong short-pointed faintly striate; alar cells somewhat numerous, the others sublinear; costa mostly thin gen. reaching to acumen, sometimes thicker, shorter and forked. Capsule subobovate or arcuate; pedicel smooth; lid and male flowers not seen. Habit of *R. serrulatum*. — Logs r. *Amer.* Can. Brit. Col.: Macoun.

11.**R.styriacum** Limpricht et Breidler. — Limnobium Lpr. et Breidl. in sched.; Rhynchostegium Kindb.

Leaves (of branches) broad-ovate abruptly short-acuminate neither decurrent not striate; cells oblong-linear exc. the dusky quadrate alar. Tufts yellowish not radiculose. Synoecious. Capsules not seen. — Inundated rocks r. *Eur.* Austria near Schladming: Breidler, com. Limpricht.

cc. Leaves minutely denticulate.

12.**R.bifariellum** Kindb. — Plagiothecium cat. Can. m.

Leaves small neither striate nor crowded nor distinctly decurrent; alar cells small few quadrate, the others gen. linear. Stem-leaves short somewhat broad ovate-cordate nearly entire with falcate filiform nearly entire point; costa gen. obsolete. Branch-leaves broadly ovate-lanceolate; costa vanishing near or above middle. Capsules unknown. Stem pinnate sparingly radiculose. Tufts loose olive-green. Habit of *Eurhynchium Bolænderi*. — Wet places in woods r. *Amer*. Can. Vanc. isl.: Macoun.

50. **Taxithelium** Mitten.

1.**T.planum** Bridel. — Hypnum Brid.; Taxithelium Mitt.

Leaves from contracted base broadly suboval acute denticulate sometimes short-acuminate; alar cells subrectangular. Capsule small piriform inclined; teeth yellow; segments as high; cilia present; lid apiculate; pedicel reddish yellow very long. Stem prostrate subpinnate; branches approached. — *Amer*. r. »U. S.»: Lesq. et Jam. (Cuba: Wright, com. C. Mueller).

51. **Plagiothecium** Br. eur.

A. Branches complanate. Often dioecious.

a. Leaves undulate.

I. **Pseudo-Neckera.** Leaves decurrent large gen. quite entire. Capsule large arcuate; lid rostrate. Branches long often simple. Dioecious.

b. Leaves not undulate.

II. **Eu-Plagiothecium.** Leaves decurrent gen. quite entire often large. Capsule oblique or straight; lid r. rostrate. Plants often robust.

III. **Isopterygium.** Leaves not decurrent us. not large often denticulate. Capsule mostly oblique or arcuate; lid obtuse or rostellate. Plants not robust. Stem not long.

B. Branches not or faintly compressed. Monoecious.

IV. **Pseud-Isopterygium.** Leaves neither undulate nor decurrent nor large, gen. quite entire, sometimes curved when dry. Capsule straight or faintly curved; lid obtuse or rostellate. Stem sometimes long.

I. Pseudo-Neckera Kindb.

1.**P.undulatum** L. — Hypnum L.; Plagiothecium Br. eur.

Leaves subovate acute short-acuminate or obtusate, r. denticulate at acumen, short-decurrent, gen. crowded; upper cells narrow linear, lower lanceolate exc. the not well-defined alar. Leaves of the branchlets narrower, often long-acuminate. Capsule striate when dry; pedicel long. Branches pale or whitish green sometimes subturgid. Tufts gen. loose. — Earth and siliceous rocks in woods. *Eur*. not r. Sweden, Norway, Germany, France! *Amer*. Can.: J. Macoun. Alaska: J. M. Macoun.

2.**P.neckeroideum** Schimper.

Leaves as in the last but distant long-decurrent; nearly all cells narrow-linear exc. the short and large alar and lowest basal. Capsule not striate; pedicel long. Stem more divided, branchlets thin flagelliform. Tufts dense green. Habit of *Neckera crispa.* — Shady humid places near waterfalls in woods of subalp. region r. *Eur.* Austria: Breidler, com. Warnstorf.

II. Eu-Plagiothecium.

A. Leaves gen. large. Capsule large more or less oblique or curved; lid rostellate-rostrate or r. obtuse; pedicel long.

a. Leaves distinctly decurrent; costa short double or indistinct.

3.**P.denticulatum** L. — Hypnum L.; Plagiothecium Br. eur.

Leaves long-decurrent gen. suboblong obtusate, sometimes short-pointed, us. green; lower alar cells of the decurrent part very dilated, upper alar not well-defined, the others oblong-lanceolate. Capsule subcylindric; lid not rostellate. Monoecious us. fruiting. — Logs and rocks, common. *Eur.* Sweden etc.! *Amer.* Can.: Macoun.

* **P.subfalcatum** Austin; Sulliv. icon. musc.

Leaves less decurrent, sinuolate above, sometimes subfalcate. Capsules unknown. — Rocks r. *Amer.* U. S.: Austin, com. Macoun.

4.**P.silvaticum** L. — Hypnum L.; Plagiothecium Br. eur.

Leaves long-decurrent ovate-lanceolate gradually narrowed to a subulate point, us. dark green or olivaceous; cells as in the last. Capsule subcylindric; lid rostrate. Dioecious r. fruiting. — Rocks, less common. *Eur.* Sweden, Norway, Germany, Switzerl.! *Amer.* Can.: J. Macoun. Alaska: J. M. Macoun.

5.**P.Roesei** Hampe — Hypnum Hampe; Plagiothecium Schimp. syn.; P. Sullivantiae Schimp., Hypnum Sull. icon. m.

Leaves smaller than in the last, short-decurrent suboblong obtusate or short-acuminate, abruptly tapering to a short filiform often curved point, us. yellowish or bright green; lowest cells wide, alar often well-defined, the others sublinear-lanceolate. Capsule subcylindric nearly straight; lid rostrate-rostellate. Tufts very dense. Dioecious, less often fruiting. — Sandy or clayey ground. *Eur.* r. Sweden, Switzerl.! France: Husnot. *Amer.* not r. Can.: Macoun; Moser; Waghorne. U. S.: Roell; Sullivant, com. C. Mueller.

b. Leaves less distinctly decurrent; costa gen. indistinct, sometimes thick and simple but very short.

6.**P.brevipungens** Kindb. cat. Canad. m.

Leaves subovate or ovate-oblong acute often short-pointed; upper cells sublinear, lower lanceolate exc. the dilated well-defined alar. Capsule arcuate; lid conic obtuse not rostellate. Tufts dense green. Stem subpinnate. Leaves somewhat smaller than in *P. denticulatum*. Monoecious. — Stones in woods r. *Amer.* Can.: Macoun.

B. Leaves and capsules small; pedicel short.

a. Leaves not recurved.

7.**P.lætum** Schimper. — Leskea Berggren.

Leaves ovate-lanceolate acuminate gradually tapering to a short filiform point; alar cells large well-defined, the others oblong-lanceolate. Capsule oval-oblong subsymmetric; lid rostellate. Tufts bright green. Monoecious. — Alp. and subalp. rocks r. *Eur.* Norway!; Berggren. *Amer.* Can.: Macoun.

8.**P.decursivifolium** Kindb. cat. Can. m. — »P. passaicense» Austin in part.

Leaves narrowly suboblong often with short aciculiform point; lowest basal cells short large, alar not well-defined, the others narrow-linear. Capsule suboblong or arcuate, finally furrowed and oblique; lid rostellate or rostrate; pedicel somewhat long. Tufts green. Monoecious. — On decaying trees r. *Amer.* Can.: Macoun; Waghorne.

9.**P.latebricola** Wilson. — Leskea Wils.; Plagiothecium Br. eur.

Leaves smaller than in *P. pulchellum*, gen. filiform-pointed. Stem-leaves ovate-oblong subobtusate long-pointed; branch-leaves ovate lanceolate gradually tapering to a short sometimes subulate point; alar cells not well-defined, the others narrow-linear. Capsule cylindric-oblong straight; lid rostellate. Tufts bright green. Dioecious. — On decaying trees or ferns in shady woods r. *Eur.* Sweden: J. Persson. Germany: H. Mueller, com. Le Jolis. Belgium: Gravet. *Amer.* »U. S. and Can.»: Lesq. et Jam.

b. Leaves more or less recurved.

aa. Leaves recurved to the gen. long filiform point.

10.**P.piliferum** Swartz. — Leskea Sw.; Plagiothecium Br. eur.

Leaves suboblong; alar cells not well-defined, the others narrow-linear. Capsule cylindric-oblong straight; lid rostellate. Tufts green us. glossy. Monoecious. — Shady rocks or their crevices gen. r. *Eur.* Sweden not r., Norway! *Amer.* Can. Pacif. distr.: Macoun.

bb. Leaves partly recurved below, without long point.

11.**P.aciculari-pungens** C. M. et Kindb. cat. Can. m.

Leaves ovate-oblong with short aciculiform deflexed or patent point, narrowly recurved below middle at one side; alar cells few often large, the others oblong-lanceolate. Capsule suboblong oblique not curved; lid apiculate. Tufts dense glossy green. Branches few short not attenuate. Monoecious. Resembles a small state of *P. Roesei.* — *Amer.* r. Can.: Macoun.

12.**P.attenuatirameum** Kindb. cat. Canad. m.

Lower leaves broadly ovate obtuse or obtusate, recurved to above middle at least at one side; lower basal cells dilated nearly uniform, the others oblong lanceolate; costa sometimes simple and reaching to middle. Other leaves gradually smaller upwards, narrower, more acute or acuminate. Branches long-attenuate flagelliform above. Tufts loose faintly shining. Capsules unknown. — Rocks r. *Amer.* Can.: Macoun.

III. Isopterygium Mitten.

A. Leaves distinctly denticulate, not recurved. Capsule annulate.

a. Leaves denticulate nearly all around; alar cells gen. distinct. Monoecious, us. fruiting.

13.**P.silesiacum** Seliger. -- Hypnum Sel.; Plagiothecium Br. eur.

Leaves ovate-lanceolate long-cuspidate crowded; cells narrow-linear exc. the alar. Capsule somewhat large subcylindric arcuate not striate; teeth pale; lid obtuse; pedicel long. Tufts green. Branches us. curved deflexed. — On logs in woods, r. on rocks. *Eur.* not r. Sweden common, Norway, Switzerl.! *Amer.* r. U. S. near Washington: Roell.

14.**P.turfaceum** Lindberg; Sulliv. icon. m.

Differs from the last: Leaves smaller shorter and less crowded, narrowly ovate-oblong shorter-cuspidate; cells linear-lanceolate. Capsule smaller, narrowly ovate-oblong, striate when dry; pedicel less long. Tufts bright green. Branches us. not curved. — Turfy soil and rocks. *Eur.* r. Sweden!; S. O. Lindberg. *Amer.* not r. princ. in eastern distr.: Macoun; Moser: Waghorne.

* **P.pseudo-silesiacum** Schimper.

»Lower leaves oval narrowly acuminate spreading, the upper appressed. — *Amer.* U. S. r.»: Lesq. et Jam.

b. Leaves distantly denticulate in upper third; cells linear, alar not distinct. Dioecious very r. fruiting.

15.**P.elegans** Hooker. — Hypnum Hook.; Plagiothecium Schimper; Sulliv. icon. musc.

Leaves ovate-lanceolate short-cuspidate often somewhat large. Capsule small obovate or oblong, not or slightly curved; teeth pale; segments entire; cilia long not appendiculate; lid acute or rostellate; pedicel often long and at apex arcuate. Perichetial leaves long-acuminate filiform-pointed denticulate above. Tufts green. Stem often furnished with small shoots or filiform branchlets, falling off to propagation. — Shady rocks and earth, gen. not r. *Eur.* Sweden, Germany, Switzerl.! *Amer.* Can. less r. fruiting: Macoun; Waghorne.

B. Leaves nearly entire or near apex faintly denticulate; alar cells distinct, the others narrow-linear. Capsule not annulate. Monoecious.

16. **P. albulum** C. Mueller. — Hypnum C. M.; Plagiothecium Kindb.; »Hypnum micans Swartz»: Lesq. et Jam.

Leaves small green ovate-oblong not recurved, us. short-acuminate or with short twisted point. Capsule very small indistinctly necked, more or less oblique or arcuate; lid rostellate or r. obtuse mamillate. — Trees and stones r. *Amer.* Can.: Macoun. U. S.: Langlois, com. Cardot.

17. **P. fulvum** Hooker et Wilson. — Hypnum H. W.; Sull. ic. m.; Plagiothecium Kindb.

Leaves larger than in the last, fulvous or golden glossy ovate-oblong recurved below. Perichetial leaves longer-acuminate. Capsule shorter and thicker with thick neck; lid mamillate. Tufts nearly eradiculose. — Swamps r. *Amer.* U. S.: Langlois, com. Cardot.

C. Leaves small gen. entire. Us. dioecious.

a. Costa of leaves short double or indistinct. Dioecious.

18. **P. nitidulum** Wahlenberg. — Hypnum Wng fl. lappon.; Plagiothecium Schimper; P. Muellerianum Schimp.; Sull. ic. m.

Leaves ovate-lanceolate gradually tapering to a filiform often long point, quite entire, distant; cells narrow-linear, alar not distinct. Capsule small cylindric-oblong or subobovate, gen. oblique and faintly cernuous, annulate; cilia short; lid rostellate; pedicel short. Tufts loose glossy green. — Rocks and earth, gen. r. *Eur.* Sweden (not r.), Switzerl.! *Amer.* Can.: Macoun; Moser. — *P. Muellerianum* Schimp. (syn.) differs only in smaller narrower leaves and looser tufts. — *Eur.* Switzerl.! France: Spruce, com. Boswell.

19. **P. pseudo-latebricola** Kindb. cat. Canad. m.

Leaves entire less distant, from broadly ovate-lanceolate base suddenly tapering to a straight filiform somewhat long point; alar cells few often not distinct, the others narrowly linear. Capsule obovate-oblong oblique slightly curved often pendent; teeth pale; cilia long subappendiculate; lid conic; pedicel short.

Branches often curved; branchlets longer with smaller narrower leaves. Tufts dense glossy green. — On rotten wood r. *Amer.* Can.: Macoun; Moser.

20.**P.passaicense** Austin.

Leaves ovate-oblong short-acuminate sinuolate at acumen, nearly crowded, shorter than in the both last; lowest basal cells dilated, alar distinct, the others linear or linear-lanceolate. Capsule very small suboblong oblique or slightly curved, annulate; teeth pale; pedicel not long. Tufts green. — Logs in swamps r. *Amer.* Can.: Macoun.

b. Costa of leaves sometimes simple but very thin, reaching to middle. Monoecious.

21.**P.geminum** Mitten. — Stereodon Mitt.; Plagiothecium Kindb.

Leaves distant ovate-oblong short-acuminate nearly entire or slightly denticulate at acumen or below it; alar cells few us. distinct, the others linear. Capsule subcylindric nearly straight; pedicel short. — Rocks r. *Amer.* Can.: Macoun; Waghorne.

IV. Pseud-Isopterygium Kindb.

22.**P.pulchellum** Hedwig. — Leskea H ; Plagiothecium Br. eur.

Leaves entire ovate-oblong or broadly ovate-lanceolate, gradually tapering to a gen. short point; cells lanceolate-linear, alar not distinct. Capsule subcylindric often straight erect, annulate; lid apiculate or rostellate; pedicel sometimes long. Stem short. Tufts dense green. Leaves gen. smaller than in *P. nitidulum* and nearly crowded. — Rocks and their crevices princ. in alps. *Eur.* not r. Sweden and Norway common in alps! Switzerl.!; Schimper. *Amer.* Can.: Macoun; Waghorne. Greenl.: Berggren.

23.**P.Bottinii** Breidler.

Leaves larger than in the last, slightly denticulate at acumen, ovate-oblong or ovate-lanceolate gen. abruptly narrowed to a long filiform-pointed acumen; basal cells dilated, alar subquadrate not much wider, the others sublinear. Capsule small subcylindric or suboblong without distinct neck, oblique or curved; lid obtuse; pedicel long subcapillary; annulus not seen. Stem long. Tufts loose green or yellowish. — Peat-bogs r. *Eur.* Italy: A. Bottini.

52. **Stereophyllum** Mitten.

1.**S.Wrightii** Sullivant. — Hypnum (Omalia) Sull. ic. musc.; »Stereophyllum Mitt.»: C. M.

Leaves distant ovate-oblong or sublinear-oblong gen. obtusate, faintly denticulate above, inflexed below at one side, not large;

costa vanishing above middle. Capsule small subobovate suberect; teeth pale yellow scarcely higher or broader than segments; cilia shorter; lid conic or rostellate; calyptra narrow; pedicel longish. Stem creeping. Tufts green or golden glossy. Habit of *Neckera* (Homalia). — Roots of trees r. *Amer.* U. S.: herb. Lesquereux, com. Renauld (Cuba: Wright, herb. Sullivant, com. C. Mueller).

53. **Amblystegium** Bryol. eur.

I. **Eu-Amblystegium.** Leaves not distinctly recurved; alar cells few or indistinct.

a. Leaves decurrent.

1. **Compacta.** Leaves with well-defined alar cells; costa subpercurrent. Tufts compact with intricate stems. Us. monoecious.

b. Leaves not or indistinctly decurrent.

2. **Serpentia.** Leaves crowded or not long-distant; alar cells gen. not well-defined; costa simple. Capsule somewhat large; pedicel long. Us. monoecious.

3. **Speirophylla.** Leaves long-distant very small; alar cells us. indistinct; costa simple or obsolete. Capsule small; pedicel short. Dioecious.

4. **Subtilia.** Leaves small crowded; alar cells distinct; costa gen. obsolete. Capsule small; pedicel short. Tufts dense. Monoecious.

II. **Ptycholoma.** Leaves recurved gen. to middle; alar cells numerous green. Leaves crowded not decurrent; costa us. obsolete. Capsule small; pedicel short. Monoecious.

I. Eu-Amblystegium.

1. Compacta.

A. Leaves short-decurrent nearly crowded. Tufts very radiculose.

1. **A. compactum** C. Mueller. — Hypnum C. M.; Sulliv. ic. m.

Leaves recurved near base, ovate-oblong short-acuminate or ovate-lanceolate acute, minutely denticulate princ. below; alar cells not large, the others oblong-lanceolate us. pellucid. Capsule small oblong-cylindric with distinct neck, gen. suberect nearly straight; lid acute or apiculate; teeth pale yellow; cilia very short; pedicel long. Tufts somewhat high, green above, us. decolorate or red-brown below. Branches erect. Monoecious. — Logs r. *Amer.* Can.: Waghorne; Drummond, com. C. Mueller. *Eur.* »France»: Husnot revue bryol. 1896.

2. **A. subcompactum** C. M. et Kindb. cat. Can. m.

Differs from the last: Leaves long-acuminate not recurved; inner cells lanceolate-linear. Capsule longer, often curved; lid rostellate. — Trees in swamps r. *Amer.* Can.: Macoun. U. S.: Roell; Kelsey, com. Cardot.

B. Leaves long-decurrent very distant. Tufts sparingly radiculose. Capsules unknown.

3.**A.dissitifolium** Kindb. cat. Canad. m.

Leaves from subcordate or ovate base tapering to a sometimes long acumen, denticulate all around; alar cells somewhat large, the others oval-oblong very chlorophyllose. Tufts low green. Dioecious. — Wet limestone rocks r. *Amer.* Can. near Niagara and Owen Sound: Macoun.

2. Serpentia.

4.**A.varium** Hedwig. — Leskea H.; Amblystegium Lindb. in part.

Leaves broadly ovate-lanceolate or ovate-oblong, often entire; middle cells gen. oval-oblong; costa gen. long, also in perichetial leaves not excurrent. Capsule curved; annulus compound. Stem decumbent. Monoecious. — Logs, trees and stones, not uncommon. *Eur.* Sweden, Norway, Switzerl., Italy! *Amer.* Can.: Macoun; Waghorne.

* **A.radicale** Beauvois. — Hypnum Beauv.; Amblystegium Br. eur.

Leaves smaller and more distant, denticulate; cells gen. oblong; costa less long. — *Eur.* Switzerl.! Finl.: Lindberg.

* **A.porphyrhizon** Lindb. in Schimp. syn.

Leaves small and less broad, denticulate and crowded; cells suboblong; costa faint often vanishing near middle. Confounded with *A. serpens.* — *Eur.* not r. Sweden common, Germany, Switzerl.! Engl.: Rogers. *Amer.* Can. common: Macoun; Waghorne.

* **A.Juratzkæ** Schimper.

Leaves somewhat small denticulate more distant; cells gen. oblong-lanceolate; costa subpercurrent. *Eur.* Sweden, Switzerl., Germany! *Amer.* Can.: Macoun. U. S.: Roell.

* **A.leptophyllum** Schimper.

Leaves somewhat small denticulate crowded; cells oblong-lanceolate; costa subpercurrent. — *Eur.* France: Philibert.

5.**A.orthocladon** Beauvois. — Hypnum Beauv.; Sulliv. ic. m.; Amblystegium Kindb.

Leaves larger than in *A. varium* and very chlorophyllose, from ovate-oblong base acuminate, distant and nearly spreading; middle cells gen. suboval; costa subpercurrent, broader than in *A. varium*, in perichetial leaves still broader and excurrent. Capsule us. suberect faintly curved; annulus simple; pedicel often very long. Branches often erect. Dioecious. — Wet places. *Amer.* Can.: Macoun. U. S.: Sullivant, com. C. Mueller.

6. **A. serpens** L. — Hypnum L.; Amblystegium Br. eur.

Leaves narrower than in *A. varium*, gen. smaller and less chlorophyllose, often entire; middle cells gen. suboblong; costa faint more abbreviate. Stem-leaves narrowly suboblong-lanceolate, not much dilated at base; branch-leaves sublinear-lanceolate. Perichetial leaves long-acuminate. Capsule curved; annulus compound; pedicel long. Stem decumbent. — Trees, logs and stones gen. common. *Eur.* Sweden etc.! *Amer.* Can.: Macoun; Waghorne. U. S.: Roell, com. Cardot.

* **A. Columbiæ** Kindb. bull. Torr. club XVII.

Leaves denticulate all around, nearly spreading; cells oblong-lanceolate; costa sometimes reaching into acumen. Perichetial leaves short-acuminate. Habit of *Campylium*. — Wet logs r. *Amer.* Can. Brit. Col.: Macoun.

3. Speirophylla.

A. Leaves with subpercurrent costa. Capsules unknown.

7. **A. speirophyllum** Kindb. in Ottawa Naturalist IV.

Leaves obtusate subacute or short-acuminate, subcordate or oval-oblong, entire or slightly denticulate; cells suboval; costa gen. thin. — Rocks r. *Amer.* Can. N. Brunsw.: Moser. U. S.: Roell.

8. **A. distantifolium** Kindb. cat. Canad. m.

Leaves ovate-lanceolate long-acuminate serrulate all around, chlorophyllose and sometimes subdecurrent; cells suboblong; costa thick sometimes subexcurrent. — Rocks r. *Amer.* N. Foundl.: Waghorne.

B. Leaves with short often obsolete costa.

a. Leaves narrow gen. acute.

9. **A. Sprucei** Bruch. — Hypnum Bruch; Amblystegium Br. eur.

Leaves narrowly ovate-oblong or sublinear gen. long-acuminate entire; cells oval oblong; costa gen. indistinct. Perichetial leaves coarsely dentate above. Capsule suboblong-piriform or finally turbinate; teeth pale; lid subobtuse. R. fruiting. Dioecious. — In caverns of rocks or in swamps princ. in alps, often mixed with an hepatic (*Blepharostoma trichophyllum*). *Eur.* Sweden, Norway! *Amer.* Can.: Macoun.

* **A. minutissimum** Sullivant et Lesquereux. — Hypnum Sulliv. icon. musc.

Leaves more distinctly denticulate; costa often distinct. Tufts less loose. »Sometimes monoecious»: Sulliv. l. c. — *Amer.*

in lower districts not r. Can.: Macoun. U. S.: Sullivant, com. C. Mueller. *Eur.* r. Norway near Lille Elvedal: S. O. Lindberg and E. Nyman.

10.**A.fenestratum** Kindb. cat. Canad. m.

Leaves subhyaline denticulate narrowly ovate-lanceolate or sublinear; cells narrowly oblong; costa more or less distinct. Capsules unknown. — Borders of ponds r. *Amer.* Can.: Dearness, com. Macoun.

b. Leaves broad gen. obtuse.

11.**A.Holzingeri** Renauld et Cardot in bot. gazette.

Leaves entire subovate or ovate-oblong, sometimes short-acuminate subacute; cells suboval, princ. the upper, or suboblong; costa vanishing near middle or short forked. Perichetial leaves entire. Capsule suboval strangulate oblique or arcuate; pedicel less than 1 centim. long. *Amer.* r. »U. S.: Holzinger»: Ren. et Card. l. c.

4. Subtilia.

A. Leaves entire; costa sometimes reaching to middle. Endostome with short or none cilia.

12.**A.subtile** Hedwig. — Leskea H.; Amblystegium Br. eur.

Stem-leaves subovate-lanceolate; middle cells suboblong; branch-leaves narrower. Perichetial leaves entire us. costate. Capsule subsymmetric; lid apiculate. Tufts greenish. — On trees or r. on rocks. *Eur.* not r. Sweden! *Amer.* Can.: Macoun.

B. Leaves denticulate, at least those of branches; costa obsolete. Cilia of endostome us. long.

13.**A.confervoides** Bridel. — Hypnum Brid.; Amblystegium Br. eur.

Stem-leaves broadly ovate-lanceolate long-acuminate; middle cells suboblong; branch-leaves narrower, patent when moist. Capsule gen. arcuate; lid apiculate. Perichetial leaves denticulate. Tufts green. — Rocks gen. r. *Eur.* Sweden, Norway, Switzerl.! *Amer.* Can.: Macoun; Waghorne.

14.**A.pseudo-confervoides** Kindb. revue bryol. 1895.

Leaves smaller shorter and less distinctly denticulate than in the last; cells wider, oval-oblong. Stem-leaves ovate-oblong obtusate acute or short-acuminate. Branch-leaves suberect when moist. Capsule arcuate; lid conic obtuse; pedicel very short. Perichetial leaves nearly entire. Stems and branches subjulaceous. — Limestone rocks r. *Amer.* Can.: Macoun.

15.**A.tenuissimum** Guembel.

Stem-leaves narrowly ovate-lanceolate, faintly denticulate;

middle cells suboblong. Branch-leaves distant narrower. Capsule subsymmetric or faintly curved; lid not apiculate. Tufts green. — Earth and trees r. *Eur.* Switzerl. near Lugano and in Graubuenden!

II. Ptycholoma Kindb.

16.**A.adnatum** Hedwig. — Hypnum H.; Sulliv. icon. m.; Amblystegium Kindb.

Leaves entire gen. subovate obtusate; alar cells subquadrate on a narrow space, the others chlorophyllose gen. suboval. Capsule often arcuate; teeth yellowish; cilia often long; lid apiculate or obtuse. Perichetial leaves serrulate at the short acumen. Tufts green or dark green. — Stones and trees. *Amer.* not r. Can.: Macoun; Moser. U. S.: Sullivant, com. C. Mueller.

54. **Platyloma** Kindberg, new genus*).

1.**P.Lescurii** Sullivant. — Hypnum Sull. icon. m.

Leaves distant chlorophyllose opake, minutely denticulate all around, not decurrent; costa thick subpercurrent. Stem-leaves broadly round-ovate, abruptly short-acuminate; inner cells lanceolate-linear, alar obsolete. Branch-leaves ovate subobtuse or acute; cells oval-oblong. Perichetial leaves ovate-lanceolate; costa excurrent. Capsule suboblong or arcuate; teeth golden yellow, connate at base; segments as high, split in middle; cilia long not appendiculate; annulus large compound; lid obtuse mamillate; pedicel 2—3 centim. long. Stem irregularly branching. Tufts dark green. Monoecious. — Moist rocks r. *Amer.* U. S.: Roell; Lesquereux, com. Renauld.

55. **Calliergon** Kindberg, new genus.

(Hypnum, subsp. Calliergon et Limnobium, Sullivant.)

A. Capsule not annulate. Leaves entire.

I. **Eu-Calliergon.** Leaves not falcate; alar cells large; costa long gen. subpercurrent. Pedicel of capsule long. Stem not creeping but sometimes radiculose below, often pinnate. Dioecious or (*C. cordifolium*) monoecious.

II. **Limnobion.** Leaves of stem not falcate, those of branches often falcate; alar cells not large; costa abbreviate sometimes double or indistinct. Pedicel of capsule shortish. Stem creeping not pinnate. Monoecious.

B. Capsule annulate. Leaves sometimes denticulate.

a. Stem pinnate eradiculose. Leaves entire; costa double very short or indistinct. Dioecious.

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*) This peculiar genus is nearly similar to *Limbella* C. M. in sched., found in S. Amer. only in barren state.

III. **Pseud-Acrocladium**. Leaves not falcate; alar cells very large. Branches cuspidate by convolute leaves.

IV. **Scorpidium**. Branches not cuspidate, their leaves falcate; alar cells indistinct.

b. Stem not pinnate, sometimes radiculose.

V. **Pseudo-Limnobion**. Alar leaf-cells gen. distinct.

aa. Costa of branch-leaves subpercurrent. Stem eradiculose.

1. **Badiiformia**. Leaves entire not decurrent, those of branches often falcate. Dioecious very r. fruiting.

bb. Costa of leaves gen. short or indistinct.

2. **Ochraceiformia**. Leaves entire or nearly so, decurrent and distant; those of branches often falcate. Stem eradiculose. Dioecious r. fruiting.

3. **Molliformia**. Leaves not or indistinctly decurrent, sometimes denticulate, gen. crowded and not falcate. Stem not creeping us. eradiculose. Often monoecious.

4. **Montaniformia**. Leaves small sometimes decurrent, us. denticulate; those of branches often falcate. Stem creeping. Us. monoecious.

I. Eu-Calliergon.

A. Leaves gen. decurrent.

1.**C.cordifolium** Hedwig. — Hypnum H.

Leaves us. distant and large; upper cells linear-lanceolate, the lower (below middle) suboblong hyaline. Stem-leaves gen. subovate; costa subpercurrent. Capsule large; lid obtuse mamillate or apiculate. Stems loosely tufted, r. radiculose; branches gen. long and simple. Tufts us. green. Us. monoecious. — Swamps and other wet places not r. but not common. *Eur.* Sweden! *Amer.* Alaska: J. M. Macoun. Can: Macoun; Moser; Waghorne.

* **C. Richardsoni** Mitten. — Stereodon Mitt.; Hypnum Lesq. et Jam.; H. Breidleri Juratzka; H. cyclophyllotum Holzinger.

Leaves less distant; only the lowest basal cells dilated; the alar sometimes more distinct. Tufts more dense, often brownish with golden glossy branch-tops. Stem pinnate; branches not long. — *Eur.* Sweden, Norway! Austria: Breidler. *Amer.* Can.: Macoun.

2.**C.giganteum** Schimper. — Hypnum Sch.

Differs from *C. cordifolium*: Leaves nearly crowded; cells sublinear except the large hyaline alar. Tufts dense green or brownish. Branches pinnate with numerous branchlets. Dioecious very r. fruiting. — Swamps, common. *Eur.* Sweden, Norway! *Amer.* Can.: Macoun; Moser.

3.**C.stramineum** Dickson. — Hypnum Dicks.

Leaves oval-oblong nearly crowded or distant, smaller than in *C. cordifolium*, sometimes with red rhizoids at apex; cells gen. sublinear except the large red or hyaline alar and the often round-oval apical; costa more or less abbreviate. Capsule somewhat large; lid mamillate. Stem sparingly divided; branches long not rigid. Tufts gen. pale green, sometimes whitish or brownish, not radiculose. Dioecious. — Peat-bogs. *Eur.* common. Sweden, Norway, Switzerl.! *Amer.* Can. not r.: Macoun; Moser; Waghorne.

***C.laxifolium** Kindb. n. subsp.

Leaves narrower, very distant and longer decurrent; cells wider; costa subpercurrent. — *Amer.* Greenl.: Vanhoeffen.

***C.nivale** Lorentz. — Hypnum Lor.; Schimper.

Leaves smaller and crowded, broadly oval-oblong, appressed when dry; cells often somewhat dilated. Branches us. whitish or yellowish green. — Alpine bogs r. *Eur.* Norway! Austria: Lorentz.

B. Leaves not decurrent.

4.**C.sarmentosum** Wahlenberg. — Hypnum Wng.

Leaves red or brown-red (r. green) somewhat small and crowded, narrowly ovate-oblong or oblong-lanceolate; cells linear except the short dark red near base and the larger alar; costa gen. red and subpercurrent. Capsule smaller than in *C. cordifolium*; lid sometimes rostellate. Stem irregularly divided or subpinnate with short branches. Dioecious. — Swamps princ. in alps, gen. r. *Eur.* Norway (common and not r. fruiting)! *Amer.* Can.: Macoun; Waghorne.

II. Limnobion Kindb.

5.**C.palustre** L. — Hypnum L.

Leaves subovate often small, us. crowded, sometimes decurrent; cells sublinear (or the upper oblong-lanceolate) except the often orange-colored alar; costa variable, sometimes wanting. Stem-leaves obtusate subacute; branch-leaves gen. acute or short-acuminate. Capsule not large often curved; lid acute or apiculate. Tufts us. dirty green. — In or near mostly running water, common. *Eur.* Sweden, Norway, Switzerl., Italy! *Amer.* Can.: Macoun; Moser. .

III. Pseud-Acrocladium Kindb.

6.**C.cuspidatum** L. — Hypnum L.; Acrocladium Lindb.

Stem-leaves broad-ovate obtuse or ovate-oblong subacute, subdecurrent; upper cells oblong-lanceolate, middle linear, lower inner basal shorter and dilated, alar hyaline or red. Capsule large arcuate; lid acute; pedicel very long. Tufts dirty green or yellowish sometimes glossy. — Wet places. *Eur.* common. Sweden (often fruiting), Germany, Switzerl.! *Amer.* not common. Can.: Macoun; Moser.

IV. Scorpidium Schimper.

7.**C.scorpioides** L. — Hypnum L.

Leaves suboval-oblong not decurrent, us. very large; cells gen. linear, the lowest basal shorter and wider. Stem-leaves obtuse sometimes apiculate; branch-leaves obtuse or acute. Capsule large arcuate; lid apiculate; pedicel very long. Tufts us. brownish with golden glossy branch-tops. R. fruiting. — Peatbogs princ. in northern distr. *Eur.* Sweden, Norway (common)! *Amer.* Can.: Macoun.

V. Pseudo-Limnobion Kindb.

1. Badiiformia.

8.**C.badium** C. J. Hartman. — Hypnum Hartman.

Stem-leaves suboval short-apiculate; cells gen. linear orange-colored, the alar nearly indistinct; costa of some leaves short double. Branch-leaves ovate-oblong short-acuminate acute; costa subpercurrent. Capsule not large, more or less curved; lid obtuse; pedicel somewhat long. Stems sparingly divided, r. tufted; branches us. long and often loosed from stem, us. brown-red with golden glossy tops, r. green. Often growing together with *C. sarmentosum* or *Hypnum revolvens.* — Swamps in northern alps r. *Eur.* Norway fruiting! Sweden: R. Hartman. Finl.: Brotherus. *Amer.* Greenl.: Berggren.

9.**C.polare** Lindberg. — Hypnum Lindberg.

Leaves ovate-oblong, either obtusate (obtuse or acute) or short-acuminate and falcate, greenish or sometimes golden glossy; alar cells large hyaline, the others sublinear or the uppermost oblong-lanceolate; costa subpercurrent. Capsule slightly curved not large; pedicel short. Stems densely tufted but loosely cohering; branches sometimes subjulaceous. — Sand and stones in alp. rivulets r. *Eur.* Norway! Sweden fruiting: E. Nyman. Spetsbergen: Berggren. France: Husnot. *Amer.* »Greenl.»: Berggren.

2. Ochraceiformia.

A. Leaves entire; costa gen. short us. double. Stem not rigid; branches often long.

10.**C.ochraceum** Turner et Wilson. — Hypnum T. et W.

Stem-leaves broad-ovate obtuse not falcate; uppermost cells oblong-lanceolate, middle sublinear, alar large. Branch-leaves often curved and acute, sometimes sinuolate near apex. Capsule subovate or arcuate; lid obtuse; pedicel not long. Leaves often large, us. green or ochraceous. — Stones in running water princ. in northern alps. *Eur.* not r. Norway common, Sweden! Spain: Levier. *Amer.* Alaska: J. M. Macoun. Can. not r.: Macoun, fruiting; Moser; Waghorne.

11.**C.Goulardi** Schimper. — Hypnum Sch.

Leaves small not falcate, broadly subcordate obtuse very concave; cells suboblong or oblong-lanceolate exc. the small alar. Capsule very small, faintly curved; lid obtuse; pedicel short. Tufts dark green. Branches often very long. — Earth and stones in upper alp. region r. *Eur.* Norway (fruiting)! Sweden: E. Nyman. Austria: Breidler. *Amer.* Can.: Macoun. Greenl.: Berggren.

B. Leaves crenulate all around; costa subpercurrent. Stem rigid when dry; branches not long.

12.**C.torrentis** C. M. et Kindb. — Hypnum cat. Can. m.

Leaves smaller than in the last, subcircular not falcate, recurved below; cells as in the last. Capsules unknown. Stem filiform. — Rocks in mountain torrents r. *Amer.* Can. Rocky mts: Macoun.

3. Molliformia.

A. Monoecious often fruiting. Leaves us. denticulate above. Stem eradiculose.

a. Alar leaf-cells large, in elder leaves finally red.

13.**C.eugyrium** Schimper. — Hypnum Sch.; H. subeugyrium Renauld et Cardot ?

Leaves ovate-oblong either obtusate (obtuse and cucullate at apex or acute) or short-acuminate, entire or near apex faintly denticulate; cells gen. sublinear exc. the alar; costa us. double. Capsule subobovate or slightly curved; lid obtuse; pedicel not long. Tufts us. brownish with golden glossy branch-tops, sometimes green. — Rocks in running water or near lakes gen. r. *Eur.* Germany! Sweden: C. Hartman. Engl.: Rogers. *Amer.* Can.: Macoun; Moser; Waghorne.

b. Alar leaf-cells small nearly indistinct; the inner dilated. Stem rigid at least when dry.

14.**C.arcticum** Sommerfelt. — Hypnum Somf.

Leaves subcircular obtuse entire or very faintly sinuolate above, crowded, small or large; inner cells oval-oblong; costa us. double. Capsule small faintly curved; segments not split;

lid obtuse; pedicel not long. Tufts dense dark green or blackish. Branches not long. — Stones in alp. rivulets gen. r. *Eur.* Norway! *Amer.* r. Can.: Macoun.

c. Alar leaf-cells not red, gen. distinct; the inner sublinear. Stem soft.

15.C.**molle** Dickson. — Hypnum Dicks.; H. dilatatum Wilson; H. alpinum Schimper.

Leaves subcircular or oval-ovate with contracted base, obtuse or short-apiculate, crenulate or sinuolate above, crowded; alar cells gen. small; costa us. double. Capsule arcuate; lid obtuse or apiculate; pedicel short. Tufts dense brown or brownish green often with golden glossy branch-tops. Stem sometimes denudate below; branches more or less turgid. — Wet alp. rocks. *Eur.* not r. Norway! *Amer.* r. Can.: Macoun.

16.C.**alpestre** Swartz. — Hypnum Sw.

Leaves entire suboblong, narrower than in the last and less patent when moist, crowded, either obtusate apiculate or short-acuminate acute; alar cells often large, sometimes orange-colored; costa often simple. Capsule as in the last but often with longer pedicel. Habit of the last. — Wet rocks in northern alps r. *Eur.* Norway! *Amer.* Can.: Macoun. Greenl.; Berggren.

17.C.**columbico-palustre** C. M. et Kindb. — Hypnum cat. Can. m.

Leaves suboblong denticulate above middle, crowded; alar cells large; costa simple, reaching above middle. Capsule arcuate; lid flat mamillate; pedicel somewhat long. Tufts green or golden glossy. — Wet rocks r. *Amer.* Can. Brit. Col.: Macoun.

18.C.**circulifolium** C. M. et Kindb. — Hypnum cat. Can. m.

Leaves subreniform or subcircular with cordate base, faintly crenulate all around, distant and green; cells and costa as in *C. molle.* Capsules unknown. — Rocks below alps r. *Amer.* Can. N. Brunswick: Moser.

B. Dioecious very r. fruiting. Leaves us. entire; alar cells very small or indistinct. Stem often simple.

a. Stem julaceous eradiculose. Leaves entire obtusate crowded; costa short.

19.C.**turgescens** T. Jensen. — Hypnum T. Jens. 1858.

Leaves large ovate or broad-ovate obtuse, sometimes short-apiculate, brown or green, nearly appressed when dry; cells oblong-lanceolate, the alar indistinct; costa double. Stem thick very turgid not rigid. Swamps in alps or heaths (in Sweden) below alps r. *Eur*. Sweden, Norway! *Amer*. Can. Macoun. Greenl.: Berggren.

20.C.**trifarium** Weber et Mohr. — Hypnum W. M.

Leaves somewhat small, broad-ovate or subcircular, obtuse or subacute, brownish, strongly appressed when dry; lower basal cells short dilated, the others sublinear; costa sometimes simple. Capsule small suboblong or faintly curved; lid convex short-apiculate. Stems (branches) gen. very long and not tufted, not thick but very rigid when dry. Resembles *C. stramineum* — Peat-bogs r. *Eur*. Norway! Sweden: R. Hartman; O. W. Redelius. *Amer*. Can. fruiting: Macoun.

b. Stem not julaceous, sparingly radiculose. Leaves faintly denticulate above, short-acuminate somewhat distant; costa sometimes prolonged and simple.

21.C.**submolle** Kindb. — Limnobion rev. bryol. 1895.

Leaves with subovate base, sometimes acute, not falcate; cells linear, alar nearly indistinct. Tufts loose brown. Capsules unknown. — Rivulets in higher alp. region r. *Eur*. Norway in Snehætten: D:r P. Olsson.

4. Montaniformia.

A. Dioecious. Capsules unknown. Leaves dentate-serrulate.

22.C.**micans** Wilson. — Hypnum Wils.; Chrysobryum Lindb.; Sulliv. icon. musc.

Leaves broad-ovate or subcircular obtuse or acute, sometimes short-acuminate, recurved below, serrulate to below middle, not or slightly curved, subdecurrent, crowded or subdistant; cells gen. suboblong, inner basal yellow; costa gen. short and double. Tufts brown with golden glossy branch-tops. — Wet rocks r. *Eur*. Irel.: G. A. Holt. *Amer*. »U. S.»: Sulliv.

B. Monoecious. Capsule small subovate or arcuate; lid obtuse; pedicel short.

a. Leaves crowded, not or indistinctly decurrent, denticulate at least above middle; costa us. short and double.

23.C.**pseud-arcticum** Kindb. — Hypnum cat. Can. m.

Leaves broad-oval or subcircular gen. obtuse, denticulate above middle, us. not distinctly falcate when moist; cells sublinear-lanceolate except the hyaline alar. Tufts brown with green or glossy green branch-tops. Resembles a small variety of *C. palustre*, which differs in entire leaves and not annulate capsule. — Wet stones in subalp. region r. *Amer*. Can. Brit. Col.: Macoun.

24.C.**montanum** Wilson. — Hypnum Wils.

Leaves subovate acute apiculate or short-acuminate, denticulate all around, falcate or incurved; cells oblong-lanceolate except the often yellow alar. Tufts bright green or brown with green branch-tops. — Stones in rivulets r. *Eur.* Norway: Kaurin; E. Nyman. *Amer.* Can.: Macoun; Waghorne. U. S.: Roell; James, com. Levier.

b. Leaves distant decurrent nearly entire; cells oblong-lanceolate; costa often simple.

25.**C.pseudo-montanum** Kindb. — Hypnum cat. Can. m.

Leaves subovate-oblong often somewhat long-acuminate, acute or obtuse, denticulate at apex, falcate or incurved, larger than in the last; alar cells more distinct; costa simple reaching above middle. Tufts bright green. Habit of the last, but branches are longer. — Stones in rivulets r. *Amer.* Can.: J. Macoun; Waghorne; Drummond n. 206 in part. Alaska: J. M. Macoun.

26.**C.viridulum** Hartman. — Hypnum Hartm. skand. flora; H. norvegicum Schimper.

Leaves broad-ovate obtuse entire or slightly sinuolate at apex, not distinctly falcate; alar cells hyaline; costa simple or double. Tufts green. Resembles a small *C. ochraceum.* — Alp. rivulets r. *Eur.* Norway!; J. E. Zetterstedt; Kaurin (fruiting). *Amer.* U. S. Oregon, mount Hood: Roell.

56. **Camptothecium** Bryol. eur., in part.

A. Stem us. brown-tomentose.

1. **Tomentella.** Capsule large; lid not rostrate; pedicel long smooth. Leaves entire gen. large. Stem not regularly pinnate, not creeping; branches straight not julaceous, often distant. Tufts yellowish or golden glossy, r. green or brown. Dioecious.

B. Stem not tomentose but sometimes radiculose.

a. Stem us. irregularly divided; branches somewhat long and distant, not julaceous, often straight. Dioecious or monoecious.

2. **Luteolaria.** Capsule large; lid us. rostrate; pedicel long sometimes smooth. Leaves large and narrow; those of branches us. denticulate. Stem often nearly eradiculose. Tufts glossy yellowish or greenish.

b. Stem us. pinnate; branches gen. short and crowded, subjulaceous or julaceous, us. curved. Pedicel of capsule rough; lid not rostrate. Gen. dioecious.

3. **Sericaria.** Capsule large; pedicel not long. Leaves us. large, those of branches denticulate. Stem rigid us. creeping. Tufts us. green and silky glossy.

4. **Aureolaria.** Capsule small; pedicel short. Leaves small, those of branches often nearly entire. Stem not rigid, often not creeping. Tufts us. golden glossy.

1. Tomentella.

1. **C. nitens** Schreber. — Hypnum Schr.; Camptothecium Schimper.

Leaves narrowly triangular (subovate-lanceolate) gradually long-acuminate filiform-pointed, not decurrent; alar cells very small, the others linear; alar and lower basal cells brown; costa reaching to acumen. Capsule oblong or subcylindric finally arcuate; teeth yellow; lid apiculate. Tufts us. yellowish or golden glossy. — Swamps and peat-bogs. *Eur.* common in northern districts. Sweden, Norway! *Amer.* not common. Can.: Macoun; Waghorne.

In var. *atrichum* Kindb., a princ. arctic plant, tufts are us. brown, stems without tomentum. Capsules unknown. — *Eur.* Norway near Kongsvold! Spetsbergen: R. Gyllencreutz.

2. Luteolaria.

A. All leaves subulate-acuminate; inner cells linear. Stem-leaves gen. entire.

a. Leaves plicate not or shortly decurrent; alar cells small.

2. **C. lutescens** Hudson. — Hypnum Huds.; Camptothecium Br. eur.; C. fallax Philibert; C. fulgescens Mitten.

Leaves narrow-triangular gen. long-acuminate, not decurrent; apical cells of uppermost branch-leaves sometimes oblong, alar not well-distinct, the others gen. linear; costa reaching to acumen. Stem-leaves entire; branch-leaves narrower, faintly denticulate at acumen and near base, the uppermost often shorter and serrate above. Perichetial leaves variable, gradually or abruptly narrowed. Capsule more or less oblique often arcuate; teeth yellow; endostome variable often not well-evolute; pedicel rough. Often pseudo-monoecious. Tufts us. yellowish or green-yellow. Branches gen. straight. Dioecious. — On rocks and earth or on base of trees. *Eur.* not r. Sweden, Switzerl.! *Amer.* Pacif. distr. r. Can.: Macoun. U. S.: Roell, com. Cardot.

* **C. æneum** Mitten. — Hypnum Mitt.; Camptothecium Kindb.; Homalothecium subsericeum C. M.

Leaves gen. shorter acuminate short-subulate, us. golden glossy; those of branches more distinctly denticulate. Capsule shorter-pedicellate; teeth dark yellow; endostome more evolute; cilia sometimes appendiculate. Branches often curved. *Amer.* Pacif. distr. r. Can.: Macoun. U. S. Henderson, com. Cardot.

3. **C. nevadense** Lesquereux. — Hypnum Lq.; Camptothecium Kindb.

Differs from *C. lutescens*: Leaves gradually short-acuminate, gen. larger; costa longer, vanishing in acumen. Peristomial teeth orange. — Rocks r. *Amer.* Pacif. distr. Can. Brit. Col.: Macoun.

4.**C.oxycladon** Bridel. — Hypnum Brid.; C. M. syn.; Camptothecium Kindb.

Leaves long-acuminate subulate filiform-pointed short-decurrent, entire or at acumen faintly sinuolate; alar cells hyaline; costa reaching to acumen or shorter. Branches compressed not curved. Tufts green silky glossy. »Capsule oval symmetric inclined; lid obtuse; pedicel smooth. Monoecious»: C. M. syn. — *Amer.* r. Can: Macoun.

5.**C.Philippei** Spruce. — Isothecium Spr.; Camptothecium Kindb.; Homalothecium Br. eur.

Leaves narrow-triangular long-acuminate, more or less decurrent and auricled. Stem-leaves entire; costa long-excurrent. Branch-leaves faintly denticulate above, often also near base; costa vanishing in acumen. Perichetial leaves us. abruptly narrowed to a long subfiliform point. Capsule subcylindric-oblong straight symmetric; teeth yellow; endostome not well-evolute; pedicel smooth or in lower part faintly rough. Tufts us. green and silky glossy, gen. very dense. Branches straight or slightly curved. Dioecious. — Calcareous rocks gen. r. *Eur.* Switzerl.! Austria: Venturi. France: Schimper; Husnot. Germany: com. Warnstorf.

b. Leaves plicate long-decurrent; alar cells very large, hyaline or reddish.

6.**C.lamprochryseum** C. M. et Kindb. — Brachythecium cat. Can. m.

Leaves gradually narrowed to a short narrowly subulate or filiform often curved point, strongly plicate. Stem-leaves gen. entire; costa vanishing near middle. Branch-leaves faintly denticulate all around; acumen longer, costa often reaching to it. Capsule subovoid or arcuate; teeth yellowish or in lower part brown; endostome well-evolute; cilia not appendiculate; lid not seen; pedicel very rough, often long. Tufts us. golden yellow shining. Stem subpinnate; branches straight. Monoecious. Resembles somewhat *C. lutescens* and *Brachythecium rivulare.* — Mountain torrents and marshes r. *Amer.* Pacif. distr. Can.: J. and J. M. Macoun.

c. Leaves faintly striate decurrent; lower basal cells nearly uniform not large, alar not well-defined. Stem us. creeping.

7.**C.acuminatum** Hedwig. — Leskea H.; Camptothecium Kindb.; Homalothecium Ren. et Card.; »Hypnum Beauvois»: Sulliv. ic. m.

Leaves crowded with subulate gen. not long acumen, entire and recurved below, above middle us. faintly denticulate; middle and upper cells linear; costa often reaching in acumen. Stem-leaves subovate-oblong less distinctly triangular; branch-leaves subtriangular ovate-lanceolate. Perichetial leaves long-triangular filiform-pointed. Capsule us. cylindric straight; cilia rudimentary; segments not well-evolute; annulus none; lid long-conic acute; pedicel not long. Tufts compact us. green silky glossy. Stem creeping; branches subjulaceous often sciuroid-curved. Dioecious but often fruiting. — Trees and rocks, sometimes in water. *Amer.* not r. Can.: Macoun. U. S.: Sullivant, com. C. Mueller.

***C.stenocarpum** (Ren. et Card., as var.) Kindb. (in Hedwigia 1896).

Capsule narrower; lid from convex base abruptly rostellate. Leaves distinctly denticulate nearly all around. — *Amer.* r. U. S. Wisconsin: Roell.

8.**C.spurio-acuminatum** C. M. et Kindb. — Brachythecium cat. Can. m.

Differs from *C. acuminatum*: Capsule curved; endostome well-evolute; cilia long. Leaves distinctly denticulate all around. Perichetial leaves subulate-acuminate. Tufts loose sparingly radiculose. Monoecious. — Logs r. *Amer.* Can.: Macoun.

B. Branch-leaves obtusate obtuse; apical cells suboblong, lower oblong-lanceolate. Stem-leaves also denticulate.

9.**C.alsioides** Kindb. in Pittonia 1892.

Leaves indistinctly decurrent; costa reaching to acumen or in branch-leaves shorter. Stem-leaves broadly ovate-lanceolate, attenuate to a short acute or subulate acumen, faintly denticulate above middle, more distinctly serrulate at acumen; alar cells quadrate numerous, the others sublinear. Branch-leaves narrower, more sharply serrate above. Perichetial leaves abruptly narrowed to a long subuliform denticulate often deflexed acumen. Capsule subcylindric curved; teeth orange; segments yellow, lacunose in middle; cilia not appendiculate; lid flat apiculate; pedicel rough about 16 centim. long. Tufts bright green glossy. Stem curved pinnate; branches obtuse often curved when dry. Dioecious. — Rocks r. *Amer.* California: Marshall A. Howe.

3. Sericaria.

A. Capsule us. straight symmetric; segments short; cilia none. Stem-leaves somewhat long-decurrent, us. diversiform; alar cells few.

10.C.sericeum L. — Hypnum L.; Camptothecium Kindb.; Homalothecium Br. eur.

Stem-leaves gen. entire, the elder short; costa reaching to acumen. Branch-leaves longer and narrower, denticulate above middle, often also at basal angles; costa longer, not percurrent. Capsule ovate-oblong or subcylindric; teeth pale yellow; annulus revoluble; lid often apiculate. Stem rigid pinnate. Tufts us. green and silky glossy. — Male plant much smaller; leaves smaller and narrower, those of stem often dentate below, those of branches with long subfiliform point — Trees and stone. *Eur.* common. Sweden, Switzerl.! *Amer.* r. U. S. Calif.: Mrs L. C. Feely. Can.: Macoun.

B. Capsule asymmetric or curved; segments long; cilia present. Stem-leaves short-decurrent; alar cells numerous.

11.**C.Geehebii** Milde. — Hypnum Milde; Camptothecium Kindb.; Brachythecium Schimper.

Leaves subovate-oblong, those of stem entire, those of branches denticulate at acumen; costa vanishing in acumen. Capsule suboval; teeth orange; cilia short; annulus persistent; lid long-conic; pedicel 1 c. m. long. Stem pinnate. Tufts dusky green. — Dry princ. basaltic rocks r. *Eur.* Germany: A. Geheeb.

12.**C.Amesiæ** Renauld et Cardot. — C. dolosum R. C.?

Differs from the last: Uppermost branch-leaves serrate at acumen with oblong cells above costa. Capsule oval-oblong or narrower; cilia long; lid short conic. Tufts silky glossy brown-green. — Rocks r. *Amer.* Pacif. distr. Can.: Macoun. U. S.: Henderson, com. Cardot.

4. Aureolaria.

A. Leaves decurrent, those of stem entire, those of branches sinuolate or serrate above. Stem with none or few rhizoids.

a. Leaves small not long. Capsule oblong; teeth orange; segments and cilia long.

13.**C.aureum** Lagasca. — Hypnum Lag.; Camptothecium Br. eur.

Leaves gen. subovate-oblong entire, slightly recurved; cell-linear exc. the alar. Branch-leaves sometimes faintly sinuolate at acumen. Perichetial leaves entire gen. short-acuminate. Capsule nearly straight; lid apiculate. Stem sometimes with paraphyllia. Tufts golden glossy. — Stones r. *Eur.* Mediterran distr. Greece: Orphanides, com. Heldreich. France: Philibert.

14.**C.pinnatifidum** Sullivant et Lesquereux; Sull. ic. m.

Differs from the last: Inner leaf-cells lanceolate-linear.

Perichetial leaves long-acuminate with filiform point. Capsule curved; lid mamillate. — Shaded rocks r. *Amer.* Pacif. distr. Can.: Macoun; Roell. U. S.: Bolænder, com. C. Mueller.

15.**C.arenarium** Lesquereux.

Differs from *C. aureum*: Stem-leaves more distinctly recurved; branch-leaves serrate above. Branches less crowded us. straight. Tufts dirty yellowish. — Sandy ground r. *Amer.* Pacif. distr. Can.: Macoun. U. S.: Bolænder, com. C. Mueller and Renauld.

b. Leaves long narrow somewhat large. Capsules unknown.

16.**C.sericeoides** C. M. et Kindb. cat. Canad. m.

Leaves long-acuminate subulate; those of branches denticulate at acumen, entire below; inner cells linear. Perichetial leaves serrate to below middle, gradually acuminate subulate. Stem not creeping; branches curved. — Rocks r. *Amer.* Can. Brit. Col.: Macoun.

B. Leaves small and, at least on those of branches, denticulate gen. all around. Branches crowded and us. curved.

a. Leaves long narrow gradually long-acuminate. Stem pinnate.

17.**C.Nuttallii** Wilson. — Hypnum Wils.; Sull. ic. musc.; Camptothecium Schimper.

Leaves subulate-acuminate decurrent, broadly recurved often to middle, minutely serrulate above to below middle, stronger dentate at base; inner cells linear. Capsule narrowly ovate-oblong, slightly curved; teeth orange; segments long or short; cilia rudimentary; lid apiculate or rostellate. Stem us. creeping; branches short. Tufts us. golden glossy. Sometimes pseudo-monoecious. — On trees and logs, r. on rocks. *Amer.* Pacif. distr. r. Can.: Macoun Canad. musci n. 280. U. S.: Roell; Bolænder, com. Renauld.

18.**C.hamatidens** Kindb. bull. Torr. club XVI.

Differs from the last: Leaves sharply hooked-dentate at base and at acumen, nearly entire in middle. Capsule subovate; segments long split in two divergent legs; cilia distinct. Stem nearly eradiculose with often long branches. Tufts often green and silky glossy. — On rocks r. on trees. *Amer.* Pacif. distr. less r. Can.: Macoun. U. S.: Roell and Miss Mann, com. Cardot.

b. Leaves short and broad.

aa. Stem pinnate radiculose.

19.**C.leucodontoides** Kindb. revue bryol. 1895.

Stem-leaves from short-triangular (subcordate or broad-ovate) base abruptly narrowed to a long falcate subulate filiform-pointed acumen, minutely denticulate above to below middle, stronger serrate at base, broadly recurved only near base, long-decurrent; alar cells hyaline very numerous, the others linear; costa reaching to acumen. Branch-leaves ovate-oblong subtriangular acute or short-acuminate, minutely denticulate but near apex serrate, recurved all around; apical cells oblong. Capsules unknown. Stem creeping, rigid when dry; branches brown-yellowish golden glossy. Dioecious. — *Amer.* r. U. S. California: Mrs L. C. Feely 1882.

20. **C. corticola** Kindb. — Homalothecium bull. Torr. club XVII.

Stem-leaves ovate-triangular with long filiform point, denticulate at base, sinuolate or nearly entire above, not or near base slightly recurved, indistinctly decurrent; alar cells few not hyaline, the others linear-lanceolate; costa reaching to the point. Branch-leaves subtriangular or broadly ovate-oblong, short-acuminate acute minutely denticulate, recurved to acumen; upper cells rhomboidal or oval-oblong; costa shorter. Capsule oblong-cylindric straight or slightly curved; teeth orange; segments long split; cilia none; annulus broad; lid short-pointed; pedicel short faintly rough. Branches subjulaceous. Tufts green compact. Monoecious or pseudo-monoecious. Habit of *Pylaisia intricata.* — On bark of trees r. *Amer.* Pacif. distr. Can.: Macoun.

bb. Stem eradiculose, irregularly divided.

21. **C. aureolum** Kindb. revue bryol. 1895.

Leaves small not decurrent, minutely denticulate all around, short-triangular subovate-oblong (or on branches broadly ovate-lanceolate) with subulate not long acumen; alar cells few, the others lanceolate-linear; costa vanishing below acumen. Capsules unknown. Tufts golden glossy. Branches curved. Habit of *C. aureum.* Dioecious. — Rocks r. *Eur.* Norway: E. Nyman; C. Kaurin. U. S. Pacif. distr.: Roell, com. Cardot (»Homalothecium nevadense var. subulatum» Cardot).

57. **Eurhynchium** Bryol. eur., in part.

A. Leaves very distinctly mamillose (subpapillose).

I. Scabridaria. Lid of capsule gen. not rostrate; pedicel rough. Leaves decurrent, serrate or serrulate all around gen. not large. Stem us. pinnate; branches not compressed. Us. dioecious.

B. Leaves, princ. the uppermost on branches, faintly mamillose near apex.

a. Pedicel of capsule (exc. *E. tenellum* and *E. labradoricum*) smooth.

aa. Alar leaf-cells us. distinct.

II. **Stokesiella.** Lid of capsule rostrate. Leaves us. distant and decurrent. Mostly dioecious.

1. **Prælonga**. Leaves not appressed. Stem us. pinnate.

2. **Velutinoidea**. Leaves appressed when dry. Stem not pinnate.

III. **Illecebrina.** Lid of capsule not rostrate. Leaves large crowded not decurrent, appressed when dry. Stem irregularly divided. Mostly dioecious.

IV. **Starkeella.** Lid of capsule not rostrate. Leaves decurrent gen. nearly crowded, us. small and not distinctly appressed when dry. Stem gen. subpinnate. Mostly monoecious.

bb. Alar leaf-cells not distinct.

V. **Rhynchostegiella.** Lid of capsule us. rostrate. Leaves more or less distant, not distinctly decurrent and not appressed, very small. Stem not pinnate. Monoecious.

b. Pedicel of capsule smooth or (sometimes in *E. collinum*) indistinctly rough. Alar leaf-cells gen. distinct.

VI. **Leiopodium.** Mostly monoecious.

1. **Muraliformia.** Lid of capsule rostrate. Leaves gen. large. Stem us. irregularly divided. Monoecious.

2. **Strigosiformia.** Lid rostrate. Leaves us. small, those of branches often obtuse. Stem mostly pinnate. Us. dioecious.

3. **Colliniformia**. Lid not rostrate. Leaves us. small. Stem us. not pinnate. Mostly monoecious.

I. Scabridaria Kindb.

A. Leaves serrate all around, those of branches small narrow gradually acuminate. Stem thin not rigid.

1.**E. graminicolor** Bridel. — Hypnum Brid.; Eurhynchium Renauld et Cardot; Hypnum Sullivantii Spruce; Sull. ic. m.

Leaves ovate-oblong or broadly ovate-lanceolate with subulate gen. shortish point, not striate, slightly recurved, patent or spreading when dry; cells sublinear or lanceolate exc. the alar; costa vanishing near acumen. Perichetial leaves filiform-pointed. Capsule suboval; lid long-conic apiculate or rostellate; pedicel not long. Tufts intricate green not glossy. Stem irregularly divided; branches short distant. Habit of *E. prælongum.* Dioecious r. fruiting. — On earth r. *Amer.* Can.: Macoun; Moser. U. S.: Roell.

2.**E. subscabridum** Kindb. note on Canad. bryol. 1893.

Differs from the last: Stems subjulaceous; branches attenuate longish nearly crowded. Leaves shorter, more concave and longer decurrent; alar cells more numerous. Stem-leaves ovate filiform-pointed; branch-leaves ovate-oblong long-acuminate. Tufts pale green. Sometimes pseudo-monoecious. Capsules unknown. — Limestone rocks r. *Amer*. Can.: Macoun; Waghorne.

B. Leaves serrate all around broad and somewhat large subobtusate or abruptly short-acuminate. Stem thick rigid.

3.**E.scabridum** Lindberg in litt. — Bryhnia Kaurin.

Leaves short acute faintly striate strongly mamillose, long-decurrent recurved near base; alar cells somewhat numerous, the others sublinear-lanceolate; costa vanishing near middle or shorter. Stem-leaves ovate; branch-leaves ovate-oblong. Capsule suboval; lid long-conic. Tufts dark green. Stem decumbent gen. irregularly divided; branches short obtuse distant straight often subjulaceous. Dioecious. — Earth r. *Eur*. Norway: **N. Bryhn; E. Nyman.**

C. Leaves serrulate at the subulate shortish point, broad and somewhat large. Stem thick rigid.

4.**E.Novæ Angliæ** Sullivant et Lesquereux. — Hypnum S. L.; Sull. ic. m.; Eurhynchium Kindb.; Hypnum Lq. et Jam.

Leaves not striate, nearly appressed when dry and not recurved, from gen. broad-ovate base abruptly acuminate; alar cells subquadrate, the others lower suboval, the upper oblong-lanceolate; costa vanishing below acumen. Capsule oblong or curved; lid long-conic sometimes rostellate; pedicel not long. Tufts somewhat loose, brownish or yellowish at least below, often pale green above. Stem ascending subpinnate; branches gen. straight and short. Dioecious. — Wet rocks r. *Amer*. Can.: Moser. U. S.: Austin, com. Macoun; Sullivant et Lesq., com. Cardot.

5.**E.chloropterum** C. M. et Kindb. — Hypnum cat. Can. m.

Differs from the last: Leaves striate not appressed, often recurved to middle, less abruptly narrowed, glaucous green and longer decurrent; upper cells sublinear; costa shorter, vanishing near middle. Branches often fasciculate in upper part of stem, us. curved. Sometimes monoecious. Resembles somewhat *Hypnum decipiens* or a *Thuidium* in habit. — Wet earth and rocks r. *Amer*. Can. N. Brunswick: Moser; N. Foundl. common: Waghorne.

II. Stokesiella Kindb.

1. Prælonga.

A. Leaves denticulate all around.

a. Leaves long-acuminate; those of stem very broad at base, long-decurrent; angular cells numerous, special alar large.

6.**E.Stokesii** Turner. — Hypnum Turn.; Eurhynchium Br. eur.

Leaves serrulate striate with narrowly subulate acumen; cells gen. linear exc. the angular; costa vanishing in acumen. Leaves of the thicker stem broad-ovate often filiform-pointed; those of branches ovate or ovate-oblong; those of the complanate branchlets very small and narrow. Capsule strangulate suboval or curved; pedicel often long. Tufts us. green. Stem us. ascending, sometimes with paraphyllia; branches thin often fasciculate. R. fruiting. — On earth and stones or at base of trees. *Eur.* princ. in southern distr. Germany, Italy! Sweden: Lindberg. *Amer.* common in Pacif. distr. Can.: Macoun. U. S.: Mrs L. C. Feely; Henderson, com. Cardot.

***E.pseudo-speciosum** Kindb. n. subsp.

Leaves squarrose; costa vanishing below acumen. Stem creeping. Capsules unknown. — Wet places r. *Amer.* Alaska: J. M. Macoun. *Eur.* Sweden: J. Persson.

7.**E.oreganum** Sullivant. — Hypnum Sull.; Eurhynchium Kindb.

Differs from *E. Stokesii*: Leaves larger, minutely denticulate, less distant or nearly crowded. Capsule not distinctly constricted. Tufts looser, finally yellowish. Stem decumbent more rigid; primary branches thick often plumiform; branchlets not complanate. — Logs in woods r. *Amer.* Pacif. distr. Can.: Macoun; Dawson. U. S.: Hertzman, com. E. Nyman; Henderson, com. Cardot.

b. Leaves not much broad at base, gen. not or slightly decurrent, with a not long acumen; angular (alar) cells few. Stem decumbent; branches often complanate.

aa. Leaves large serrulate gen. distinctly decurrent. Sometimes synoecious.

8.**E.speciosum** Bridel. — Hypnum Brid.; Eurhynchium Milde; Hypnum Starkii C. M. syn.

Leaves short-acuminate subovate or (those of branches) ovate-oblong, faintly striate, very chlorophyllose, distant; cells sublinear exc. the alar; costa vanishing below acumen. Capsule oval-oblong; pedicel long. Stem creeping somewhat thick. Tufts green often glossy. — Humid stones and earth in woods. *Eur.* not r. in south. distr. Switzerl., Germany!

bb. Leaves not large, gen. minutely denticulate; those of branches not distinctly decurrent.

9.**E.prælongum** L. — Hypnum H.; Eurhynchium Br. eur.; Hypnum distans Lindb.; H. hians Sull. ic. m.

Leaves distant gen. subovate subobtusate and not striate; cells us. oblong-lanceolate; costa vanishing below acumen.

Capsule oval-oblong; pedicel sometimes long. Stem us. thin and eradiculose with distant branches. Tufts greenish us. loose and not glossy. — On earth and logs, less often on rocks. *Eur.* common. Sweden, Germany, Switzerl., Italy! *Amer.* less common. Can.: Macoun; Moser; Waghorne. U. S.: Langlois, com. Cardot. Greenl.: Wenck, com. Roell.

* **E.Swartzii** Turner. — Hypnum Turn.; Lindb.; Eurhynchium Curnow.

Leaves broad-ovate short-acuminate crowded; cells oblong-lanceolate. Stem thicker and somewhat rigid, sparingly radiculose; branches nearly crowded. Tufts dark green somewhat dense. — Shaded stones and logs in woods. *Eur.* not common. Sweden!; Lindberg.

* **E.Schleicheri** Hedw. fil. — Hypnum H. f.; Eurhynchium Lorentz.

Leaves ovate-lanceolate sometimes long-acuminate, us. crowded; cells sublinear; costa long often short-excurrent. Capsule and pedicel shorter. Tufts dense. — Rocks r. *Eur.* Sweden! Belgium: Roemer.

* **E.hians** Hedwig. — Hypnum H., not Sulliv.; Eurhynchium Kindb.

Leaves gen. ovate-lanceolate with longish filiform point; upper cells lanceolate. Capsule smaller; pedicel short. Stem creeping. — *Amer.* probably not r. Can.: Macoun; Moser. U. S.: Hall, com. Macoun.

10.**E.pumilum** Wilson. — Hypnum W.; Eurhynchium Schimp.

Leaves distant subdistichous very small subovate (or those of branches ovate-oblong) acute, neither striate nor decurrent; cells suboblong or broadly lanceolate exc. the not much distinct alar; costa vanishing near middle. Capsule small oval; pedicel short. Tufts dense green. Stem creeping subcapillary. Resembles a small var. of *E. prælongum*. — Earth and rocks r. *Eur.* Switzerl.!

11.**E.ticinense** Kindb. bull. soc. bot. ital. 1895. — E. Teesdalei var., Kindb. revue bryol. 1892.

Leaves small subdistant or nearly crowded, ovate-oblong or broadly ovate-lanceolate, acute or short-acuminate, not decurrent; upper cells lanceolate-oblong, lower nearly uniform subquadrate; costa percurrent or subpercurrent, well-distinct. Stem thin sparingly radiculose, irregularly divided. Tufts compact green. Capsules and flowers unknown. Resembles *Eurhynchium Teesdalei*, which differs in opake still smaller and narrower leaves.

— Stones and stonewalls r. *Eur.* Switzerl. near Lugano! Italy near Como!

B. Leaves (at least those of stem) entire below, distant, somewhat large. Stem decumbent; branches gen. not complanate.

a. Leaves decurrent.

12.**E. pseudo-velutinoides** Kindb. revue bryol. 1895.

Leaves subulate-acuminate filiform-pointed not or slightly striate, faintly reflexed near base; cells sublinear; costa short. Stem-leaves entire subovate or ovate-oblong; costa scarcely reaching to middle. Branch-leaves ovate-lanceolate denticulate all around; costa reaching somewhat above middle. Perichetial leaves with very long filiform point. Capsules not seen; pedicel rough. Tufts loose green. Stem not creeping. — On earth r. *Amer.* Can. Vanc. isl.: Macoun 1893.

b. Leaves not decurrent.

13.**E. scleropus** Br. eur.; Husnot muscol. gall.

Leaves ovate or ovate-oblong with short subulate point, serrate above, not recurved; upper and middle cells oval-oblong, the lower suboblong except the alar; costa vanishing above middle far below apex. Perichetial leaves with long filiform point. Capsule oval-oblong; pedicel not long. »Tufts yellowish or olive-green, nearly eradiculose. Resembles *E. velutinoides* but differs from it in larger more distant not distinctly striate leaves, their cells wider.» Husnot l. c. — Rocks r. *Eur.* »Germany: Muehlenbeck»: Schimper.

14.**E. lentum** Mitten. — Hypnum Mitt.; Eurhynchium Kindb.

Leaves less large, pellucid not striate, nearly crowded. Stem-leaves entire subovate abruptly tapering to a somewhat long narrowly subulate point; cells linear exc. the small dusky at the insertion, the alar not distinct; costa vanishing near middle. Branch-leaves ovate-oblong recurved and entire to above middle, denticulate in upper part; upper cells oblong-lanceolate, the lower linear exc. the lowest basal; costa thicker below, vanishing above middle. Capsule oblong-cylindric subarcuate; lid not seen; pedicel short. Tufts yellowish green eradiculose. Branches somewhat compressed. — Logs in woods r. *Amer.* Can. Vanc. isl.: Macoun Canad. musci n. 292, determined by Prof. C. Mueller.

2. Velutinoidea.

A. Leaves minutely denticulate all around.

15.**E. Dawsoni** Kindb. bull. Torr. club XVII.

Leaves decurrent nearly crowded, large. Stem-leaves from subovate base somewhat long-acuminate, recurved below; upper cells lanceolate, the lower and the numerous angular rhomboidal-oblong, special alar not well-defined; costa vanishing in acumen or subpercurrent. Branch-leaves ovate-oblong short-acuminate. Capsules unknown. Tufts dense dirty green nearly eradiculose. — Logs and rocks r. *Amer*. Can. Pacif. distr.: Macoun.

B. Leaves nearly entire below middle.

16.**E.velutinoides** Bruch. — Hypnum Bruch; Eurhynchium Br. eur.; »Hypnum filiforme Lamarck»: C. M. syn.

Leaves with short subulate or filiform twisted point, recurved below middle, distant decurrent, somewhat large; cells lanceolate exc. the subquadrate near base, alar not well-defined; costa reaching to or in acumen. Stem-leaves ovate-oblong often entire; branch-leaves ovate-lanceolate more or less striate. Capsule oblong; pedicel short very rough. Tufts yellowish or green, silky glossy. Habit of *Brachythecium populeum* and *B. crassinervium*. — Trees and rocks r. *Eur*. Switzerl.! Austria: Breidler. France: Anthouard, com. Berthoumieu.

17.**E.Villardi** Renauld et Cardot. — Brachythecium R. et C.; Eurhynchium Kindb.

Differs from the last: Leaves less distant; cells linear-lanceolate except the few quadrate alar; costa not reaching to acumen. Capsules unknown; »pedicel rough; monoecious»: R. et C. — *Amer*. r. U. S. Pacif. distr. Roell; also com. Cardot.

III. Illecebrina C. Mueller (Scleropodium Schimper).

A. Leaves round-obtuse at apex (r. subapiculate), entire or at apex obsoletely crenulate. Stem eradiculose; branches often long. Very r. fruiting.

18.**E.obtusifolium** Drummond. — Hypnum Dr.; Eurhynchium Kindb.

Leaves suboval, the lower broader; apical cells oblong, alar hyaline somewhat large, the others narrow-linear; costa thick vanishing near apex. Tufts glossy green or finally brown. Habit of *E. rusciforme*. Dioecious. »Capsule oblong horizontal»: Lesq. et Jam. — Stones in brooks. *Amer*. Pacif. distr. not r. Can.: Macoun. U. S.: Roell, com. Cardot.

B. Leaves not arrounded at apex, more or less denticulate. Stem more or less radiculose; branches short.

a. Branch-leaves minutely denticulate. Dioecious.

19.**E.illecebrum** Beauvois. — Hypnum »Beauv.»: Lindb.; »Schwægrichen»: Schimp.; Eurhynchium Milde; Hypnum (Scleropodium) Ornellanum Molendo, Limpricht ?

Lower stem-leaves entire ovate abruptly short-acuminate. Upper stem-leaves subdenticulate narrowly ovate-oblong, gradually subulate-acuminate; branch-leaves shorter, ovate-oblong acute or subobtuse, sometimes with filiform point; upper cells rhombic-oblong, middle and lower lanceolate-linear, the not large angular hyaline subquadrate; costa stout but not long, vanishing near or above middle, sometimes forking. Perichetial leaves long-acuminate nearly entire. Capsule horizontal turgid oval-oblong or faintly curved; lid apiculate or rostellate. Tufts green or golden glossy. Branches obtuse. — On rocks or stonewalls or on earth in grassy places r. *Eur.* Italy: Arcangeli. Greece: Heldreich. France: Husnot; Le Jolis. Germany: Roell. Engl.: Curnow. *Amer.* »U. S.»: Lesq. et Jam.

20.**E.cæspitosum** Wilson. — Hypnum Wils.; Eurhynchium Milde.

Differs from the last: Stem-leaves entire, from subovate base tapering to a short subulate point. Branch-leaves subovate short-acuminate acute; costa thinner. Capsule suboblong nearly straight suberect; lid short-apiculate. Tufts green or dirty green. Branches attenuate. — Sandstone, willow-trees and humid earth r. *Eur.* Engl.: Wilson, com. Schimper. France: com. Husnot. *Amer.* Can.: Macoun.

21.**E.subcæspitosum** Kindb. revue bryol. 1895.

Differs from the both last: Leaves narrower, less crowded and not densely appressed; those of stem ovate-oblong often filiform-pointed; cells gen. linear exc. the dilated hyaline alar and lowest basal. Branch-leaves denticulate only in upper $^1/_4$. Tufts yellowish green faintly glossy. Capsules unknown. — Wet rocks r. *Amer.* Can. Vanc. isl.: Macoun 1893.

b. Branch-leaves sharply serrate near apex. Monoecious.

22.**E.Macounii** Kindb. revue bryol. 1895.

Stem-leaves ovate-oblong long-acuminate often filiform-pointed, denticulate at least at acumen. Branch-leaves subovate-lanceolate obtusate denticulate below; upper cells rhombic, alar hyaline subquadrate, the others sublinear lanceolate; costa stout vanishing above middle. Perichetial leaves long-acuminate filiform-pointed denticulate above. Capsule narrow-cylindric suberect nearly straight; lid rostellate. Tufts golden glossy or green. Stem subpinnate; branches acute. — Logs and willow-trees r. *Amer.* Pacif. distr. Can.: Roell; Macoun Canad. musci 290 in part.

IV. Starkeella Kindb.

A. Leaves more or less striate or plicate. Monoecious.

a. Branch-leaves serrate. Pedicel rough. Leaves not plicate.

23.**E.oedipodium** Mitten. — Hypnum Mitt.; Eurhynchium Kindb.; Hypnum curtum Lindb.; Brachythecium Starkii Schimp. syn. in part; B. pseudo Starkii Ren. et Card.

Leaves large gradually acuminate with sublinear or filiform often twisted point, long decurrent, more or less distant; alar cells large hyaline subquadrate not numerous; other cells lanceolate; costa not reaching to acumen, often very short. Stem-leaves subovate denticulate all around; branch-leaves from broadly ovate-oblong base tapering to a somewhat long acumen. Capsule large oval-oblong or arcuate; cilia appendiculate; lid rostellate or mamillate; pedicel long. Tufts loose green faintly glossy. — On earth in woods, probably not uncommon. *Eur.* Sweden!; S. O. Lindberg. *Amer.* Can.: Macoun; Moser; Waghorne. U. S.: Roell, com. Cardot.

24.**E.trachypodium** Funck. — Hypnum Funck; Eurhynchium Kindb.; Brachythecium Br. eur.

Leaves not large, not or shortly decurrent, distant or crowded; alar cells small gen. not much distinct; other cells gen. sublinear; costa vanishing near middle or shorter. Stem-leaves gen. ovate-oblong sometimes with long straight filiform point; branch-leaves narrower, gradually subulate. Perichetial leaves fimbriate. Capsule not large, oval-oblong not or slightly curved; cilia not appendiculate; pedicel short. Tufts dense or loose, often golden glossy. Stem creeping subpinnate. Resembles *Brachythecium velutinum.* — Caverns and crevices of alp. rocks r. *Eur.* Norway, Switzerl.! *Amer.* Greenl.: Berggren.

* **E.Payoti** Schimper. — Brachythecium Sch.; Eurhynchium Kindb.

Leaves crowded: those of stem often abruptly narrowed to a curved filiform point. Capsules unknown. — In alps r. *Eur.* Mont Blanc: Payot, com. Husnot.

b. Branch-leaves minutely denticulate or nearly entire. Pedicel sometimes faintly rough or smooth. Leaves plicate nearly crowded.

25.**E.glaciale** Br. eur. — Brachythecium B. e.; Eurhynchium Kbg.

Leaves subovate with short subulate or filiform point, nearly appressed when dry; upper cells either linear-lanceolate or oblong-oval, lower basal suboval except the numerous subquadrate (green or hyaline) alar. Stem-leaves broad-ovate, sometimes long-decurrent and nearly entire; costa gen. vanishing in middle. Branch-leaves ovate denticulate all around; costa reaching to acumen.

Perichetial leaves erect. Capsule small suboval not curved; cilia not appendiculate; pedicel gen. short, us. faintly rough. Tufts dense green often not glossy. Stem subpinnate more or less radiculose. Leaves variable in size, sometimes nearly as smalls as in *E. reflexum*. — Earth near rivulets in higher alp. region r. *Eur.* Norway, Switzerl.! *Amer.* Greenl.: Berggren.

26.**E.Roellii** Renauld et Cardot. — Brachythecium R. et C.; **Eurhynchium Kindb.**

Leaves subovate or ovate-oblong with somewhat short acumen, denticulate all around, less appressed; cells lanceolate exc. the few quadrate dusky alar; costa gen. not reaching to acumen. Capsules unknown. Stem eradiculose irregularly divided. Tufts dirty green. *Amer.* r. Can. Vanc. isl.: Roell, com. Cardot.

27.**E.labradoricum** Kindb. n. sp.; »E. subglaciale» in litt. ad Macoun.

Differs from *E. glaciale*: Leaves larger somewhat glossy, not appressed when dry; cells sublinear except the large not numerous alar; costa vanishing near middle. Stem-leaves gen. entire; branch-leaves long-acuminate minutely denticulate above. Perichetial leaves patent. Capsule curved; pedicel quite smooth, 3—4 c. m. long; lid acute; peristome not seen. — *Amer.* r. Can. Northern Labrador: Macoun 1896.

B. Leaves not striate. Capsule us. small; pedicel rough.

a. Branch-leaves serrate. Monoecious. Stem us. creeping.

28.**E.reflexum** Starke. — Hypnum St.; Eurhynchium Kindb.; **Brachythecium Br. eur.**

Leaves small and short with subfiliform or subulate gen. not long point; cells wide (as in *Amblystegium*): upper suboblong, the very numerous basal and angular larger, suboval or rotundate; special alar cells green few not well-defined; costa percurrent. Stem-leaves broadly round-ovate nearly entire, abruptly narrowed to the point. Branch-leaves ovate-oblong subulate-acuminate serrate all around. Capsule us. small suboval or arcuate; cilia appendiculate; lid apiculate; pedicel faintly rough, often not long. Tufts us. dense green. Stem rigid pinnate or bipinnate. — On rocks, earth and base of trees. *Eur.* not r. Sweden and Norway common! *Amer.* Can.: Macoun; Waghorne.

29.**E.pacificum** Kindb. n. sp. — Brachythecium reflexum var. **pacificum Renauld et Cardot.**

Differs from the last: Leaves larger and narrower with gen. long filiform point; cells oblong-lanceolate exc. the well-defined alar; costa abbreviate. Stem irregularly divided and not rigid. Capsules not seen. — *Amer.* r. U. S. Pacif. distr.: Roell.

30.**E.Starkei** Bridel. — Hypnum Brid.; Lindb.; Eurhynchium Kindb.; Brachythecium Br. eur. in part.

Differs from the resembling *E. reflexum*: Leaves a little larger, distinctly denticulate all around, with short often twisted point; upper cells sublinear, lowest oblong-oval not numerous, alar quadrate hyaline well-defined; costa not percurrent, often vanishing below acumen. Tufts more dense. Stem irregularly divided or subpinnate. — Rocks r. *Eur.* Norway, Switzerl.! *Amer.* Can. Macoun; Waghorne.

b. Leaves minutely denticulate. Dioecious. Stem sparingly radiculose.

31.**E.Bolænderi** Lesquereux. — Hypnum Lesq.; Eurhynchium Kindb.

Leaves subdistichous very small, short-acuminate acute; cells gen. linear exc. the few quadrate alar. Stem-leaves ovate or ovate-oblong, sometimes filiform-pointed; costa vanishing near middle. Branch-leaves broadly ovate-lanceolate; costa vanishing above middle. Capsule suboval very small; lid subobtuse; pedicel short. Tufts brownish dense. Stem thin not rigid, irregularly divided. — Wet places in woods r. *Amer.* U. S. Pacif. distr.: Bolænder, com. Renauld.

V. Rhynchostegiella Bruch et Schimper.

A. Pedicel of capsule smooth. Leaves not opake and not much distant; costa well-defined. Tufts silky glossy. Us. fruiting.

32.**E.algirianum** Bridel. — Pterogynandrum Brid. 1798; Eurhynchium Kindb.; Hypnum tenellum Dickson 1801.

Leaves narrowly ovate-lanceolate gradually long-acuminate with filiform point, nearly entire; cells linear; costa reaching into acumen or shorter. Capsule oval; lid rostrate. — Crevices of gen. calcareous rocks and stone-walls. *Eur.* not r. in southern distr. Italy, Switzerl., Sweden!

B. Pedicel rough. Leaves opake distant; costa gen. faint or not well-defined. Tufts not glossy. R. fruiting.

33.**E.Teesdalei** Smith. — Hypnum Sm.; Eurhynchium Schimp.

Leaves gen. broadly oblong-lanceolate and obtusate, denticulate nearly all around; cells lanceolate; costa gen. subpercurrent. Capsule oval-oblong; lid rostellate or apiculate. — Rocks near water r. *Eur.* Engl.: Holt; Rogers. Italy: Arcangeli.

* **E.Jacquini** Garovaglio. — Hypnum Gar.; Eurhynchium Kindb.; Rhynchostegiella Limpricht.

Leaves gen. narrower and acute or short-acuminate. — *Eur.* r. Austria: Venturi. Sweden: E. Wetterhall.

34.**E.curvisetum** Bridel. — Hypnum Brid.; Eurhynchium Husnot.

Leaves oblong-lanceolate us. short-acuminate acute, nearly entire below middle; cells lanceolate; costa shortish. Capsule oval-oblong; lid rostrate. — Rocks r. *Eur.* Italy: Arcangeli. *Amer.* U. S.: James.

***E.litoreum** Notaris. — Hypnum Not.; Eurhynchium Kindb., Rhynchostegiella Limpricht.

Leaves long-acuminate narrower. Lid of capsule rostellate. — Wet rocks r. *Eur.* Switzerl.! France: Husnot. Germany: Schimper.

VI. Leiopodium Kindb.

1. Muraliformia.

A. Leaves suboval-ovate obsoletely denticulate or entire; cells gen. lanceolate-oblong.

35.**E.murale** Necker. — Hypnum Neck.; Eurhynchium Milde; Rhynchostegium Br. eur.

Leaves obtusate (obtuse or short apiculate), nearly crowded; not decurrent; alar cells suboval; costa thin gen. not long, sometimes obsolete. Capsule oblong; pedicel short. Tufts green. Stem creeping; branches sometimes julaceous. — Stone-walls and rocks. *Eur.* Switzerl.! Sweden r.: S. Hardin; Berggren. Engl.: Cash. France: Husnot.

B. Leaves ovate or ovate-oblong denticulate; cells gen. linear.

a. Leaves not decurrent. Pedicel short.

36.**E.rusciforme** Weis. — Hypnum Weis; Eurhynchium Milde; Rhynchostegium Schimp.

Leaves us. obtusate (acute or r. obtuse) and large, r. distant; lowest basal cells oblong-oval few not much distinct; costa thick long often subpercurrent. Capsule oval-oblong. Tufts us. olive-green. Stem often rigid, r. creeping. Plants us. robust, often sterile. — Wet rocks and logs nearly common. *Eur.* Sweden, Norway, Switzerl., Italy! *Amer.* Can.: Macoun; Waghorne.

37.**E.confertum** Dickson. — Hypnum Dicks.; Eurhynchium Milde; Rhynchostegium Br. eur.

Leaves acute or short-acuminate, nearly crowded; lowest basal cells oval-oblong, alar not much distinct; costa thin vanishing near middle, sometimes obsolete. Capsule suboblong or arcuate. Tufts green. Stem creeping not rigid. Plants not robust. — On stones, r. at base of trees. *Eur.* not r. in southern distr. Switzerl.!

* **E.Delognei** Piré; Boulay muscin. de la France.

Leaves oblong-lanceolate subdistichous; costa longer. — *Eur.* r. France: Husnot.

b. Leaves decurrent and distant. Pedicel long.

38.**E.megapolitanum** Blandow. — Hypnum Bl.; Eurhynchium Milde; Rhynchostegium Br. eur.

Leaves acute acuminate often pellucid, alar cells large numerous subquadrate; costa thin vanishing near middle. Capsule arcuate suboblong or subcylindric. Tufts green or pale green, sometimes glossy. Stem not creeping. — Sandy places and stones gen. r. *Eur.* Switzerl.! Germany: Warnstorf.

2. Strigosiformia.

39.**E.strigosum** Hoffmann. — Hypnum Hoffm.; Eurhynchium Br. eur.

Leaves serrulate gen. not much distant and not long-decurrent; middle cells sublinear, lowest basal short; costa not long, vanishing above middle. Lower stem-leaves ovate-oblong acuminate. Branch-leaves subovate obtusate (acute or obtuse); their apical cells often oval-oblong; costa often short. Capsule suboblong gen. faintly constricted, r. arcuate; cilia not appendiculate. Tufts us. green and faintly glossy. Stem creeping, sometimes with paraphyllia. Dioecious or pseudo-monoecious. — On rocks and on base of trees. *Eur.* not common. Sweden and Norway not r.! *Amer.* Can. common: Macoun; Waghorne. U. S.: Roell.

* **E.præcox** Hedwig. — Hypnum H.; Eurhynchium Notaris.

Branches julaceous; their leaves gen. obtuse. Tufts dense. Stem not pinnate. — Earth and rocks r. *Eur.* Norway! *Amer.* Can.: Macoun.

* **E.diversifolium** Bryol. eur.

Branches us. julaceous; their leaves gen. obtuse with suboblong inner cells. Tufts less dense. Stem sometimes pinnate. — On earth r. *Eur.* Norway! *Amer.* Can.: Macoun.

40.**E.substrigosum** Kindb. cat. Canad. m.

Differs from *E. strigosum*: Leaves larger and subdistichous, more distant and long-decurrent, glossy yellowish. Capsule strangulate larger; cilia appendiculate. Branches more distant. Monoecious. — Rocks r. *Amer.* Pacif. distr. Can. Brit. Col.: Macoun. U. S.: Roell.

41.**E.acutifolium** Kindb. rev. bryol. 1895; in Hedwigia 1897. Differs from *E. strigosum*: Leaves long-distant long-decurrent with long subulate acumen, spreading also when dry; branches more distant; pedicel of capsule longer; monoecious. — Wet logs r. *Amer.* Pacif. distr. Can. Vanc. isl.: Macoun 1893. U. S. Washington: Fenzler, com. Roell.

3. Colliniformia.

A. Leaves entire somewhat large. Monoecious.

42.**E.Krausei** C. Mueller. — Hypnum C. M.; Eurhynchium Kindb.

»Leaves narrowly oblong-lanceolate short-acuminate; cells sublinear exc. the small numerous pellucid alar; costa often forking. Capsule cylindric arcuate; lid conic mamillate; pedicel short. Tufts pale green. Stem irregularly divided; branches julaceous. — *Amer.* r. Alaska: Krause»: C. M. in Flora 1887.

B. Leaves small serrulate not decurrent. Capsule erect nearly symmetric. Synoecious.

43.**E.utahense** James. — Brachythecium Jam ; Sull. icon. musc.; Eurhynchium Kindb.

Leaves broadly ovate-lanceolate gradually acuminate, serrulate or at the subulate acumen serrate; cells sublinear exc. the quadrate well-defined alar; costa reaching to middle. Perichetial leaves serrate above. Capsule suboval; cilia very short; annulus narrow; lid obtuse; pedicel short. Tufts pale fuscescent. Stem creeping; branches not distinctly julaceous. Habit of *E. collinum.* — Sandstone rocks in alp. region r. *Amer.* »U. S. Utah»: Sullivant.

C. Leaves small gen. serrulate all around. Capsule oblique. Monoecious.

44.**E.collinum** Schleicher. — Hypnum Schl.; Eurhynchium Kindb ; Brachythecium Br. eur.

Leaves decurrent, faintly striate. Stem-leaves from broad-ovate base suddenly tapering to a subfiliform often twisted point; upper cells linear hyaline, lower oblong, angular oval-quadrate, special alar not well-defined; costa vanishing near middle or shorter. Branch-leaves ovate less abruptly narrowed and stronger dentate; costa often reaching above middle. Capsule thick suboval often horizontal; lid subobtuse; pedicel short sometimes slightly and distantly rough. Tufts green faintly glossy, us. compact. Stem creeping; branches short subjulaceous. Habit of *E. strigosum* **præcox*. — Rocks and their crevices in alps r. *Eur.* Norway! *Amer.* Can.: Macoun. U. S.: Roell, com. Cardot.

* **E. tromsoënse** Kaurin. — Brachythecium Kaur.; Eurhynchium Kindb.

Leaves more minutely denticulate, those of stem nearly entire. Pedicel smooth. — Rocks r. *Eur.* Sweden below alpine regions: Arnell.

* **E. idahense** Renauld et Cardot. — Brachythecium R. C.; Eurhynchium Kindb.

»Leaves larger, subsecund; costa reaching to $^2/_3$. Pedicel smooth sometimes 17 m. m. long. — *Amer.* r. U. S.»: Ren. et Card.

45. **E. Bryhnii** Kindb. botan. notiser 1896. — Brachythecium collinum var. Bryhnii Kaurin.

Tufts less compact. Leaves narrowly ovate-oblong gradually acuminate; inner basal cells sublinear; costa longer. Capsule oblong much longer pedicellate. — Caverns of rocks in higher alp. region r. *Eur.* Norway in Knudshoe near Kongsvold 1500 metr. a. s.!; N. Bryhn and P. Olsson.

46. **E. pseudo-collinum** Kindb. — Brachythecium Kindb. cat. Canad. m.

Differs from *E. collinum*: Branches not being julaceous. Leaves somewhat larger and longer, ovate-lanceolate gradually tapering to a short twisted point, not densely crowded; cells chlorophyllose, alar larger; costa reaching above middle. — *Amer.* Can. N. Brunsw. below alp. district: Moser; Labrador: Waghorne.

58. **Brachythecium** Bryol. eur.

A. Leaves gen. large and (also when moist) plicate, us. (except *B. mamilligerum*) recurved at borders. Lid of capsule not rostrate; pedicel smooth.

I. **Salebrosaria.** Leaves large (exc. *B. lævisetum* and sometimes *B. albicans*), often filiform-pointed, gen. (exc. *B. digastrum* and sometimes *B. albicans*) long. Stem often radiculose. Dioecious or monoecious, r. synoecious.

1. **Eplicata.** Leaves not plicate.
2. **Plicata.** Leaves plicate.

B. Leaves large not plicate, faintly or not recurved. Lid of capsule (exc. *B. Ryani* and sometimes *B. Vaucheri*) us. rostrate; pedicel (exc. *B. fagineum*) rough.

II. **Eurhynchiopsis.** Leaves gen. broad and not long; upper branch-leaves us. abruptly narrowed to a long filiform point. Stem sparingly radiculose; branches often julaceous. Dioecious r. fruiting.

C. Leaves large (exc. sometimes *B. populeum*) and (exc. *B.*

spurio-rutabulum and sometimes *B. rivulare*) not plicate when moist, often recurved. Lid of capsule (exc. sometimes *B. vallium* and *B. asperrimum*) not rostrate; pedicel rough.

Leaves not abruptly narrowed to the less often filiform point.

a. Leaves gen. short and broad, r. recurved, sometimes plicate.

III. **Rutabularia.** Pedicel of capsule distinctly and wholly rough. Mostly dioecious.

b. Leaves not plicate, often recurved, gen. long.

IV. **Plumosaria.** Pedicel of capsule very faintly rough or sometimes nearly smooth. Monoecious.

V. **Pseudo-Plumosaria.** Pedicel of capsule very rough; lid sometimes rostrate. Monoecious or dioecious.

D. Leaves not large and gen. not broad, r. plicate and less often recurved. Lid of capsule not rostrate; pedicel us. rough.

VI. **Velutinaria.** Stem us. creeping.

I. Salebrosaria Kindb.

1. Eplicata.

1.**B.Mildei** Schimper. — Hypnum acutum Mitten; Brachythecium Sull. ic. m.

Leaves nearly entire (or faintly sinuolate) narrowly ovate-oblong or ovate-lanceolate with long subulate acumen, not recurved below, subdecurrent somewhat distant; alar cells somewhat large hyaline not few, the others sublinear; costa longish but not reaching to acumen. Capsule arcuate; teeth brown-yellow; cilia appendiculate; annulus none; lid conic apiculate; pedicel often long. Tufts green or yellowish faintly glossy and sparingly radiculose. Branches slightly compressed often subpinnate. Monoecious or synoecious us. fruiting. — Peat-bogs, logs and stones not common. *Eur.* Sweden! Germany: Milde. *Amer.* Can.: Macoun. U. S.: com. Macoun; Roell.

2.**B.pseud-albicans** Kindb. bull. Torr. club XVII.

Leaves short-acuminate faintly denticulate all around, somewhat distant, patent when dry; lowest basal cells finally brown, alar large on a triangular space, the others linear-lanceolate; costa short vanishing below or near middle. Stem-leaves ovate; branch-leaves ovate-oblong. Tufts yellowish sparingly radiculose. Branches compressed. Capsules unknown. Dioecious. — Wet logs or sand-dunes near Pacific sea r. *Amer.* Can. Vanc. isl.: Macoun Canad. m. n. 285.

2. Plicata.

A. Leaves us. entire, more or less appressed when dry. Lid of capsule acute; cilia not appendiculate.

a. Leaves gen. entire and glossy. Annulus of capsule narrow. Dioecious.

3.**B.albicans** Necker. — Hypnum Neck.; Brachythecium Br. eur.

Leaves (at least on branches) with long subulate acumen, sometimes small; alar cells well-defined on a narrow-rectangular space, the others linear-lanceolate; costa often reaching to acumen. Stem-leaves us. subovate or with ovate base; branch-leaves ovate-oblong or ovate-lanceolate. Capsule small suboval or faintly curved; pedicel not long. Tufts us. pale or whitish green. — Mostly on dry sand. *Eur.* not uncommon. Sweden!; M. Huss, fruiting. *Amer.* r. Can.: Macoun. Alaska: Palmer. U. S.: Roell, com. Cardot.

4.**B.glareosum** Bruch; Br. eur. — B. tauriscorum Molendo.

Leaves large with subulate acumen and long filiform often twisted point; alar cells well-defined, also the lowest basal short, the others linear-lanceolate; costa gen. vanishing near middle. Stem-leaves abruptly narrowed, broadly ovate-oblong. Branch-leaves ovate-lanceolate with long subulate faintly denticulate acumen and shorter point. Capsule large arcuate; pedicel us. short. Tufts us. pale green or yellowish. Stem eradiculose sometimes with paraphyllia. — Dry gravelly or calcareous places and stone-walls. *Eur.* not common. Sweden, Norway, Switzerl.! *Amer.* r. Can.: Macoun; Drummond n. 174.

5.**B.turgidum** C. Hartman.

Leaves large entire ovate-lanceolate with subulate not long acumen; alar cells few and small, the others sublinear; costa vanishing near middle or somewhat longer. Capsula arcuate; pedicel not long. Tufts loose eradiculose yellow-green or golden glossy. Stem robust turgid often long and simple. — Swamps in alps r. *Eur.* Norway (fruit.)!; C. Hartman. Spetsbergen: R. Gyllencreutz. *Amer.* Alaska: J. M. Macoun. Greenl.: Berggren. Can.: Macoun.

b. Leaves faintly denticulate above and entire below, not glossy. Capsule not annulate. Monoecious.

6.**B.digastrum** C. M. et Kindb. cat. Canad. m.

Leaves large recurved to the short subulate acumen; alar cells small green not well-defined, the others lower suboval, the upper oblong-lanceolate; costa vanishing near acumen. Stem-leaves broad-ovate; branch-leaves ovate-oblong. Capsule curved; segments short; lid sometimes apiculate; pedicel not long. Tufts olivaceous or green. — Rocks r. *Amer.* Can.: Macoun; Moser.

B. Leaves patent when dry; those of branches us. denticulate all around. Monoecious or (*B. luteolum)* dioecious, r. synoecious.

a. Leaves entire or (at acumen) faintly sinuolate.

7.**B. mamilligerum** Kindb. cat. Can. m.

Leaves large narrowly ovate-lanceolate with long subulate filiform-pointed acumen, not or indistinctly recurved below, not densely crowded, nearly spreading when moist; alar cells not well-defined, the few lowest basal short, the others linear; costa vanishing in middle or longer. Perichetial leaves with long filiform point. Capsule suboval or arcuate not large; cilia not appendiculate; annulus none; lid mamillate; pedicel long. Tufts yellowish faintly glossy, very dense and radiculose. Stem subpinnate; branches faintly compressed. — Wet logs near springs r. *Amer.* Can. Brit. Col.: Macoun.

b. Leaves distinctly denticulate.

aa. Alar leaf-cells small green well-defined. Perichetial leaves obtuse. Dioecious r. fruiting.

8.**B. luteolum** C. Mueller. — Hypnum C. M. syn.; Brachythecium Kindb.; »B. lætum» Schimper, non Bridel.

Leaves large with shortish acumen; cells sublinear exc. the alar; costa sometimes reaching into base of acumen. Stem-leaves ovate or ovate-oblong denticulate above and filiform-pointed; branch-leaves ovate-oblong or broadly ovate-lanceolate, denticulate all around. Capsule suboblong arcuate or suberect; cilia not appendiculate; annulus none; lid short-apiculate; pedicel not long. Tufts green often glossy and radiculose. Branches often pinnate. — On calcareous or basaltic rocks, r. on trees, r. *Eur.* Switzerl., Norway! Germany: Geheeb; Roemer.

bb. Lowest basal cells nearly uniform and dilated. Perichetial leaves acute. Monoecious us. fruiting.

9.**B. salebrosum** Hoffmann. — Hypnum Hoffm.; Brachythecium Br. eur.; B. Rotæanum Notaris; B. sericeum Warnstorf; »Hypnum plumosum Hudson»: Lindb.

Leaves large ovate-lanceolate with subulate us. long and often filiform-pointed acumen, denticulate all around, us. recurved; lowest basal cells large subquadrate, the others linear-lanceolate; costa us. vanishing near middle. Perichetial leaves us. with a faint costa. Capsule large arcuate; cilia us. appendiculate; annulus narrow subpersistent; lid apiculate or acute; pedicel us. not long. Tufts more or less radiculose, us. pale or dirty green. Stem gen. not pinnate. — On stones and earth or on base of trees. *Eur.* common. Sweden, Norway, Switzerl.! *Amer.* Can. not r.: Macoun; Waghorne. U. S.: Roell, com. Cardot.

* **B.vineale** Milde.

»Leaves of stem entire. Annulus of capsule wanting. Polygamous. — *Eur.* Tirol near Meran: Milde»: Limpricht.

10.**B.lætum** Bridel. — Hypnum Brid.; C. M.; Sulliv. ic. muscor.; Brachythecium Kindb., non Schimper.

Differs from *B. salebrosum*: Capsule not annulate, often less curved; cilia not appendiculate; lid sometimes mamillate. Leaves often with distinct alar cells and longer costa, us. glossy. Tufts very radiculose and dense. »Not easily distinguished from *B. salebrosum*»: Sull. l. c. (delineated as dioecious). — Logs in shady places. *Amer.* not r. Can.: Macoun; Moser; Lawson; Waghorne. U. S.: Sullivant, com. C. Mueller; Austin, com. Macoun.

11 **B.lævisetum** Kindb. bull. Torr. club XVII.

Differs from the last and *B. salebrosum* in smaller not subulate-acuminate leaves and their longer costa; branch-leaves very short-acuminate with filiform often twisted point. Leaves ovate-lanceolate acute, denticulate above middle, crowded, not much patent when dry; lowest basal cells dilated, the others sublinear; costa vanishing in acumen. Capsule small arcuate; cilia short; annulus not seen: lid convex obtuse; pedicel not long. Perichetial leaves nerveless. Tufts glossy green. Resembles *B. populeum.* — Logs r. *Amer.* Can.: Macoun.

II. Eurhynchiopsis Kindb.

A. Leaves, princ. the uppermost of branches, with long hairlike point.

a. Leaves gen. entire, sometimes faintly denticulate near apex or also in upper basal part, often not decurrent; alar cells few; costa reaching to middle or shorter. Capsules unknown.

12.**B.cirrosum** Schwægrichen. — Hypnum Schw.; Brachythecium Schimper; B. Funckii and Myurium herjedalicum Schimp.

Leaves suboblong abruptly narrowed, often recurved below; upper cells linear, the lower lanceolate. Tufts often glossy or bright green. Stem r. pinnate; branches obtuse us. julaceous. — Earth in alp. regions r. *Eur.* Norway, Switzerl.! *Amer.* »Greenl.»: Pansch.

b. Leaves (at least those of branches) denticulate all around, decurrent; angular (alar) cells large numerous; costa reaching to or above middle.

13.**B.piliferum** Schreber. — Hypnum Schr.; Brachythecium Kindb.; Eurhynchium Br. eur.

Leaves ovate-oblong abruptly narrowed; cells sublinear exc. the alar. Stem-leaves nearly entire. Capsule oval-oblong or arcuate; lid rostrate; pedicel faintly rough. Stem pinnate; branches not julaceous. Tufts green. — On earth among grass, r. on rocks. — *Eur.* common. Sweden! *Amer.* r. Can.: Moser; Waghorne. U. S.: Austin, com. Macoun.

14.**B.Ryani** Kaurin.

Differs from the last: Leaves nearly gradually acuminate, those of branches broadly ovate-lanceolate. Lid of capsule not rostrate. — On earth r. *Eur.* Norway: Ryan, com. Kaurin.

15.**B.Vaucheri** Schimper. — Eurhynchium Sch ; Brachythecium Kindb.; Hypnum C. M.

Leaves from broadly ovate-oblong base gradually or abruptly narrowed, denticulate all around; cells lanceolate exc. the alar. Branch-leaves sometimes ovate-lanceolate. Capsule subovate or oblong; lid rostellate or short-apiculate. Stem not pinnate; branches us. julaceous. — Rocks gen. r. *Eur.* Switzerl.! Sweden: P. Olsson (fruit.). Germany: Schimper. *Amer.* r. »Can.: Macoun»: Lesq. et Jam.

16.**B.fagineum** (H. Mueller as var.) Kindb. in check-list. — Eurhynchium Vaucheri var. fagineum H. Muell.; »E. germanum Grebe»: Limpricht.

Leaves ovate-lanceolate gen. gradually acuminate and nearly entire somewhat small, not appressed when dry; cells as in the last. »Capsule curved; lid rostrate; pedicel smooth»: Limpricht. — Trees r. *Eur.* Switzerl.! France: Husnot.

B. Leaves abruptly narrowed to a short narrowly subulate often twisted point, short-decurrent.

17.**B.crassinerve** Taylor. — Hypnum Tayl.; Brachythecium Kindb.; Eurhynchium Br. eur.

Leaves broad-ovate or ovate-oblong denticulate princ. above; upper cells lanceolate, lower oblong-oval very numerous, alar nearly similar often green; costa us. thicker at base, reaching to $^3/_4$ or shorter, sometimes forked. Perichetial leaves costate long-subulate. Capsule oval-oblong; lid rostrate; cilia not appendiculate. Tufts us. green sometimes silky glossy. Stem irregularly divided; branches long often thick and julaceous. Habit of *B. rutabulum* or *B. populeum.* — Shady or humid gen. calcareous rocks. *Eur.* not r. Sweden, Germany, Switzerl., Italy!

18.**B.colpophyllum** Sullivant. — Eurhynchium Sull. ic. m.; Brachythecium Kindb.

Differs from the last: Leaves more faintly denticulate; alar and lowest basal cells suboval, the others sublinear or the uppermost lanceolate. Perichetial leaves nerveless with long filiform point. Capsule subcylindric. Stem subpinnate; branches short. — *Amer.* r. U. S. Pacif. distr.: Roell.

III. Rutabularia Kindb.

A. Leaves not or r. (sometimes in *B. rivulare*) plicate, not or faintly recurved.

a. Monoecious us. fruiting.

19.**B.rutabulum** Linné. — Hypnum L.; Brachythecium Br. eur.

Leaves more or less decurrent; alar cells hyaline somewhat large but gen. not forming distinct auricles, the others linear-lanceolate; costa vanishing above middle. Stem-leaves ovate gradually short-acuminate, minutely denticulate all around. Branch-leaves ovate-oblong longer acuminate and more distinctly denticulate princ. above. Perichetial leaves with long filiform point. Capsule ovate-oblong or cylindric arcuate; teeth brown; cilia not appendiculate; lid acute; pedicel very rough, sometimes long. Tufts sparingly radiculose. Stem irregularly divided or with pinnate not compressed branches. — Rocks and logs princ. in woods in dry stations, r. in water. *Eur.* common below alp. regions. Sweden, Switzerl., Italy! *Amer.* Can. r.: Macoun; Burgess; Waghorne.

20.**B.rutabuliforme** Kindb. cat. Canad. m.

Differs from the last: Leaves shorter acuminate. Pedicel of capsule about 1 c. m. long; cilia appendiculate. Stem very rigid. — Stones in brooks r. *Amer.* Can. Brit. Col.: Macoun.

b. Dioecious r. fruiting.

21.**B.rivulare** Br. eur. — B.rivulare *Novæ Brunsviciæ Kindb. in Ottawa Natural. IV.

Leaves long-decurrent, broader and shorter than in *B. rutabulum*; alar cells very large and hyaline or reddish, forming distinct auricles, the others lower basal suboval more numerous; costa us. vanishing near or not much above middle. Stem-leaves broad-ovate with very short point and nearly entire. Branch-leaves broadly ovate-oblong. Capsule, cilia and lid as in *B. rutabulum*; teeth red or (in european specimens) brown-red; pedicel not very rough and not long. Tufts nearly eradiculose. Stem divided in pinnate sometimes nearly tree-like branches. — Wet rocks and stones gen. in running water. *Eur.* common also in alps. Sweden, Norway, Germany, Switzerl., Italy! Germany (fruiting): Schimper. *Amer.* not common.

Can. not r. and sometimes fruiting: Macoun; Moser; Drummond n. 178. Alaska: J. M. Macoun.

* **B.flavescens** Bridel. — Hypnum Brid.; Kindb. Laubm. Schwed. u. Norw.; Brachythecium Kindb.

Leaves very broad and abruptly acuminate; costa often short and forked. Pseudo-monoecious. — *Eur.* r. Sweden in a grassy ditch near Linkœping, fruiting!; near Norrkœping: P. Olsson.

* **B.latifolium** Lindberg. — Hypnum Ldb.; Brachythecium Philibert.

Leaves smaller less crowded, nearly entire and not striate, more gradually acuminate. Capsules not seen. — Wet places in alp. regions r. *Eur.* Norway, Switzerl.! Finland: Brotherus. *Amer.* N. Foundl.: Waghorne.

22.**B.platycladum** C. M. et Kindb. cat. Can. m.

Differs from *B. rutabulum*: Leaves distinctly auricled with well-defined alar cells. Pedicel of capsule shorter. Branches compressed. Stones in woods r. *Amer.* Can.: Macoun; Moser; White.

B. Leaves plicate and recurved.

23.**B.cavernosum** Kindb. revue bryol. 1895.

Differs from *B. rutabulum*: Leaves more concave, recurved on both sides to acumen; alar and lower basal cells small green not well-defined. Lid of capsule longer pointed or rostellate. — *Amer.* r. Can.: White, com. Macoun.

24.**B.spurio-rutabulum** C. M. et Kindb. cat. Can. m.

Differs from *B. rutabulum*: Leaves longer acuminate recurved to middle, loosely disposed and long-decurrent, very much patent when dry; alar cells gen. less defined. Pedicel of capsule short. Stem pinnate creeping. — Logs r. *Amer.* Can.: Macoun; Waghorne.

* **B.columbico-rutabulum** Kindb. cat. Canad. m.

Stem-leaves nearly entire; alar cells well-defined. Pedicel of capsule longer. — Logs by water r. *Amer.* Can. Brit. Col.: Macoun.

IV. Plumosaria Kindb.

A. Pedicel of the capsule smooth below, faintly rough or sometimes nearly smooth above. Stems us. densely tufted and creeping.

a. Stem-leaves short broad subovate short-acuminate.

25.**B.plumosum** Swartz. — Hypnum Sw.; Brachythecium Br. eur.; Hypnum pseudo-plumosum Bridel; C. M.

Leaves gen. crowded, sometimes short-decurrent, nearly entire but more or less distinctly denticulate at acumen, often recurved to it; cells gen. sublinear except the few small in the angles impressed alar; costa gen. vanishing near middle. Branch-leaves ovate-oblong or ovate-lanceolate, long-acuminate often filiform-pointed. Perichetial leaves sheathing nerveless, the inner denticulate with long falcate acumen. Capsule oval-oblong or faintly curved; cilia appendiculate; lid acute or apiculate; pedicel short. Stem creeping less often subpinnate. Tufts dense us. yellowish brown and glossy. — Wet places princ. on siliceous rocks in rivulets, common. *Eur.* Sweden, Norway, Germany, Switzerl.! *Amer.* Can.: Macoun; Waghorne. U. S. Austin, com. Macoun.

26.**B.semiasperum** C. M. et. Kindb. — Eurhynchium cat. Canad. m.

Leaves nearly crowded decurrent nearly entire, from broad-cordate base tapering to a narrow subulate acumen; upper and middle cells sublinear, lower dilated; alar cells not defined; costa vanishing near or above middle. Perichetial leaves sub-oblong short-acuminate entire nerveless erect. Capsule small suboval erect or inclined; teeth papillose above; segments shorter than the high basal membrane; pedicel about 0,6 centim. long. Tufts sparingly radiculose, loose and green. Branches unilateral, gen. simple and short. Habit of the last. — Rocks in brooks r. *Amer.* Can., Brit. Col.: Macoun.

b. Leaves gen. long narrow long-acuminate.

27.**B.populeum** Hedwig. — Hypnum H.; Brachythecium Br. eur.

Leaves gen. long and not broad, with long acumen and short point, often entire at least below middle, recurved often to acumen, crowded, not or slightly decurrent; lowest basal cells short dilated, alar not defined; other cells sublinear; costa reaching to or in acumen, sometimes excurrent. Stem-leaves with ovate or ovate-oblong base, more or less striate; branch-leaves narrower. Perichetial leaves nearly nerveless, entire below the long falcate acumen. Capsule suboval not large; teeth pale; cilia r. appendiculate; lid acute or apiculate; pedicel sometimes long. Tufts us. green often glossy. Stem sometimes subpinnate. Leaves sometimes small. — Rocks and trees princ. below alp. regions. *Eur.* common. Sweden etc.! *Amer.* Can. not r.: Macoun.

* **B.nanopes** C. M. et Kindb. cat. Canad. m.

Leaves small narrow less recurved at base. Capsule smaller; teeth pale orange; pedicel very short. Tufts brownish nearly eradiculose. — Earth in subalp. region r. *Amer.* Can. Brit. Col.: Macoun.

B. Pedicel of capsule faintly rough in its whole length. Tufts loose sparingly radiculose. Stem irregularly branching. Cilia of endostome not appendiculate.

a. Leaves auricled with distinct alar cells; other cells sublinear.

28. **B. campestre** Bruch; Br. eur.

Leaves denticulate all around, recurved at one border to acumen, decurrent, narrowly ovate-oblong or ovate-lanceolate often with subfiliform twisted point; alar cells few hyaline somewhat large; costa vanishing below acumen. Capsule arcuate; teeth orange; lid apiculate; pedicel gen. long. Tufts green or yellowish faintly glossy. Habit of *B. salebrosum.* Dry and grassy places sometimes on rocks. *Eur.* r. Sweden!; H. Thedenius. Norway: Bryhn. Germany: Warnstorf. Austria: Berggren. *Amer.* Can. less r.: Macoun; Moser. U. S. New Jersey: com. Macoun.

29. **B. leucoglaucum** C. M. et Kindb. Canad. m.

Leaves sharply serrate above, recurved only near base, from ovate base suddenly tapering to a somewhat long subfiliform point; alar cells small numerous; costa long sometimes subpercurrent. Tufts whitish or subglaucous green. Otherwise as the last. — Earth and logs in woods r. *Amer.* Can. New Brunswick: J. Moser.

b. Leaves not auricled; lowest basal cells dilated nearly uniform, alar not well-distinct; other cells linear.

30. **B. mirabundum** C. M. et Kindb. l. c.

Leaves nearly entire below, denticulate at the very long involute or channelled acumen, broadly recurved at least at one side to it, ovate-lanceolate very long, gradually narrowed from the subovate concave basal part, short-decurrent; costa vanishing in acumen. Capsule small arcuate; teeth brown; pedicel very short. Tufts faintly or silky glossy, yellowish or pale green, nearly eradiculose. Branches sciuroid-curved. — Logs in woods r. *Amer.* Can. eastern distr.: Moser; Waghorne.

31. **B. gemmascens** C. M. et Kindb. l. c.

Leaves faintly denticulate all around, not decurrent, narrowly ovate-lanceolate with twisted point; costa vanishing below acumen. Capsule small round-oval oblique; teeth dark orange; segments short; lid conic apiculate; pedicel long. Tufts dense green or finally rufescent. Stem furnished with numerous male buds. — Wet logs r. *Amer.* Can. Brit. Col.: Macoun.

V. Pseudo-Plumosaria Kindb.

32.**B.asperrimum** Mitten; Sulliv. icon. musc.

Leaves minutely denticulate below, sharply serrate above, ovate-lanceolate long-cuspidate, not or faintly plicate, decurrent and somewhat distant; alar cells few not large, the others linear; costa reaching to acumen or shorter. Capsule arcuate. Dioecious. *Amer.* Pacif. distr. r. Can.: Douglas, com. C. Mueller.

33.**B.vallium** Sullivant et Lesquereux. — Hypnum Sull. et Lq.; Brachythecium Kindb.

Differs from the last: Leaves nearly entire, faintly denticulate at acumen. Pedicel of capsule shorter. Monoecious. — Logs r. *Amer.* Pacif. distr. Can.: J. and J. M. Macoun. U. S.: Bolænder, com. C. Mueller.

VI. Velutinaria Kindberg.

A. All leaves distinctly denticulate all around, not falcate when dry. Pedicel of capsule smooth.

34.**B.Fendleri** Sullivant. — Hypnum Sull. icon. m.; Brachythecium Kindb.

Leaves ovate-oblong with long subulate or filiform point, recurved near base or to acumen, crowded, sometimes decurrent, suberect; inner cells sublinear; costa reaching to or above middle. Branch-leaves serrulate. Perichetial leaves dentate above. Capsule oval-oblong, thick at base, nearly straight and suberect, very small; lid mamillate. Tufts glossy green. Stem pinnate or subpinnate. Sometimes synoecious. — Rocks r. *Amer.* U. S.: Fendler, herb. Sullivant, com. Renauld.

35.**B.Hillebrandi** Lesquereux; Sullivant icon. m.

Differs from the last: Leaves without filiform point, broader at base and not or indistinctly recurved; upper cells lanceolate, alar numerous on a triangular space nearly reaching to costa. Stem-leaves subabruptly narrowed; perichetial nearly entire. Capsule suboval faintly inclined. Tufts silky glossy. — Rocks r. *Amer.* »U. S.: Bolænder»: Sulliv.

36.**B.biventrosum** C. Mueller (in sched.).

Leaves crowded oblong-lanceolate long-acuminate sometimes recurved to acumen; alar and lower basal cells short small, the others linear; costa vanishing above middle. Branch-leaves narrower than those of stem. Capsule oblong; lid apiculate; pedicel less than 1 centim. long. Tufts green; branches very short. Habit of *B. velutinum.* — Logs in woods r. *Amer.* U. S.: Joor, com. C. Mueller.

B. All leaves nearly entire, not falcate.

a. Dioecious. Branches julaceous or subjulaceous.

37.**B.californicum** Lesquereux. — Hypnum Lq.; Brachythecium Kindb.

Leaves recurved below, long-decurrent somewhat distant; alar cells dusky obsolete, the others lanceolate; costa reaching above middle or shorter. Stem-leaves entire ovate-oblong; branch-leaves broadly ovate-lanceolate sometimes faintly sinuolate. Capsule oval-oblong arcuate; pedicel short, rough above. Tufts pale green loose sparingly radiculose. Stem subpinnate. -- Rocks and dry sand r. *Amer.* U. S.: Bolænder, com. C. Mueller.

38.**B.Fitzgeraldi** C. Mueller in Flora 1887.

Leaves more or less (often faintly) recurved, nearly entire, ovate-oblong not long-acuminate, acute or with short filiform point, crowded and not distinctly decurrent; alar cells oval or subquadrate reaching to costa, the others linear; costa not long, vanishing below acumen. Capsules unknown. — *Amer.* r. U. S. Florida: Fitzgerald, com. C. Mueller.

b. Monoecious. Branches often compressed, not julaceous.

39.**B.Donnellii** Austin. — Hypnum Aust.; Brachythecium Kindb.

Leaves narrowly ovate-lanceolate long-subulate often filiform-pointed, entire or at acumen obsoletely sinuolate, distant not decurrent; alar cells hyaline somewhat large, the others linear-lanceolate; costa vanishing near middle or shorter. Capsule small suboval horizontal faintly curved; pedicel short smooth. Tufts glossy green. Stem subpinnate creeping. — Rocks and logs r. *Amer.* Can.: Macoun.

C. Leaves sometimes falcate princ. when dry; those of stem nearly entire, those of branches distinctly denticulate. Monoecious.

a. Leaves plicate, those of branches denticulate at acumen.

40.**B.calcareum** Kindb. revue bryol. 1895.

Leaves crowded long-acuminate filiform-pointed more or less recurved, incurved-falcate when dry, patent when moist; angular cells short, special alar few hyaline much larger, the others linear. Stem-leaves with broad base; costa short gen. vanishing near middle. Branch-leaves narrow; costa nearly reaching to acumen. Capsule small arcuate; cilia not appendiculate; lid apiculate; pedicel smooth about 1 centim. long. Tufts dense radiculose green faintly glossy. Stem irregularly divided; branches not compressed. Habit of *B. intricatum.* — Limestone rocks r. *Amer.* Can. Ottawa: Macoun 1892.

b. Leaves not plicate, those of branches denticulate all around.

41.**B.velutinum** L. — Hypnum L.; Brachythecium Br. eur. in part; B. vagans Milde (a sometimes synoecious variety).

Leaves long-acuminate not recurved, distant short-decurrent, us. not curved when dry; alar cells very few scarcely distinct, the others linear-lanceolate; costa reaching above middle or shorter. Stem-leaves ovate-lanceolate; branch-leaves much narrower. Perichetial leaves dentate above. Capsule thick suboval horizontal; pedicel rough. Tufts green often glossy, very radiculose and dense. Stem us. pinnate. — Stone and wood. *Eur.* common below alp. regions. Sweden, Switzerl.! *Amer.* not common. Can.: Macoun.

42.**B.intricatum** Hedwig. — »Hypnum Hedw.; Schreber; Bridel»: C. M. syn.; Brachythecium Kindb.; Hypnum declivum Mitten.

Differs from the last: Leaves shorter and less distant not distinctly decurrent, us. falcate or incurved when dry; alar cells distinct hyaline not few. Stem-leaves ovate-oblong or broadly ovate-lanceolate, branch-leaves not much narrower. Stem r. pinnate. Tufts sometimes golden glossy. — Stone and wood. *Eur.* probably common below alp. regions. Sweden, Germany, Switzerl.! France!; Boulay. Belgium: Gravet. Italy: Arcangeli. *Amer.* Can.: Macoun. U. S.: Roell.

* **B.salicinum** Bryol. eur.

Pedicel of capsule wholly or nearly smooth. — Trees r. *Eur.* Spain: Dieck, com. Roell. France: Philibert.

43.**B.venustum** Notaris. — B. olympicum Juratzka.

Differs from *B. velutinum*: Leaves shorter and nearly uniform with long filiform or sublinear point, long-decurrent gen. recurved below nearly to middle, often subfalcate at least when dry. Capsule oval-oblong arcuate; pedicel smooth. Tufts pale green loose sparingly radiculose. — Leaves subdistant; those of stem ovate-oblong; alar cells nearly indistinct; costa reaching above middle or shorter. Branch-leaves broadly ovate-lanceolate. Stem subpinnate. — Stone and wood r. *Eur.* Switzerl. near Lugano! Cyprus: Unger. Portugal: Levier. Sweden near Norrkœping: A. Grape.

44.**B.subintricatum** Kindb. revue bryol. 1895.

Leaves narrowly ovate-oblong or ovate-lanceolate nearly uniform (those of branches not much narrower), nearly crowded (at least those of stem), decurrent, not falcate when dry; alar cells few, the others linear; costa vanishing above middle. Capsule arcuate; pedicel very rough. Stem subpinnate. — Differs from *B. velutinum* and *B. intricatum*: Leaves faintly denticulate filiform-pointed; alar cells often dilated. Perichetial leaves nearly entire with long filiform deflexed point. Capsule oblong-cylindric arcuate. Tufts loose sparingly radiculose dusky green. Branches faintly compressed. — Trees r. *Amer.* Can. Vanc. isl.: Macoun 1893.

45.**B.pseud-erythrorhizon** Kindb. in Hedwigia 1896 p. 68. Differs from *B. velutinum* and *B. intricatum*: Leaves falcate also when moist, with more or less recurved borders; those of stem more distinctly denticulate, those of branches with long filiform point. Differs also from *B. intricatum* in decurrent leaves; from *B. velutinum* in less distant leaves falcate also when dry, those of branches not much narrower, alar cells numerous. Agrees with *B. velutinum*: Leaves decurrent; pedicel of capsule rough in its whole length etc. — Higher alp. region r. *Amer.* U. S. Pacif. distr.: Roell.

59. **Campylium** (Sullivant as subg.) Mitten and Lindb., in part.

I. **Campylidium.** Leaves denticulate; costa short and double or obsolete. Stem irregularly divided. Monoecious. Growing on rocks or at base of trees.

1. **Striatella.** Leaves small long-decurrent; alar cells large. Capsule small narrow-cylindric nearly straight. Branches often compressed.

2. **Hispidula.** Leaves not decurrent and not large; alar cells small. Capsule arcuate often large. Branches not compressed.

II. **Eu-Campylium.** Leaves gen. entire; costa often simple. Stem often pinnate. Us. dioecious. Growing on wet places.

1. **Stellata.** Leaves entire not decurrent, ovate-lanceolate crowded, often large. Capsule large us. arcuate; pedicel long.

3. **Chrysophylla.** Leaves r. sinuolate-denticulate above, sometimes decurrent and distant, not large; alar cells small. Capsule arcuate not large; pedicel sometimes short.

I. Campylidium Kindb.

1. Striatella.

1.**C.striatellum** Bridel. — Leskea Brid.; Campylium Kindb.; Plagiothecium Muehlenbeckii Schimp.; Hypnum Lq. et Jam.

Leaves ovate-oblong long-cuspidate filiform-pointed, distinctly denticulate all around, not recurved, often subdistichous; cells oblong-lanceolate exc. the hyaline or orange alar. Capsule long-necked finally striate; lid obtuse; pedicel long. Tufts dense glossy green. Branches erect. Habit of *C. hispidulum* and some *Raphidostegia.* — Rocks near sea, princ. the Atlantic, and in alps, gen. r. *Eur.* Sweden and Norway (not r. on sea-coasts), Switzerl.! *Amer.* Can. near Atl. sea: Waghorne. Alaska: J. M. Macoun.

2.**C.Fitzgeraldi** Renauld. — Plagiothecium Ren.; Campylium Kindb.; Hypnum Lesq. et Jam.

Differs from the last: Leaves narrower and nearly entire, brown at insertion; cells longer and more chlorophyllose, the alar brown less large. Capsule (unripe) short-necked; pedicel less long. Branches not erect. Tufts brown not glossy. — Rocks r. *Amer.* Can.: Waghorne.

2. Hispidula.

3.**C.hispidulum** Bridel. — Hypnum Brid.; Sull. ic. musc.; Campylium Lindberg.

Leaves denticulate all around, distant, very spreading also when dry, from short broad-cordate base abruptly tapering to a long acumen; inner cells (as in *Amblystegium*) suboblong; angular cells suboval numerous, special alar not well-defined; costa us. indistinct. Perichetial leaves denticulate above. Capsule large arcuate; cilia appendiculate; lid apiculate. Tufts green somewhat high. Branches us. erect. — Rocks and base of trees. *Eur.* r. Sweden: P. Olsson; E. Nyman. Finl.: Brotherus. *Amer.* not r. Can.: Macoun; Moser. U. S.: Henry, com. Cardot.

4.**C.Sommerfeltii** Myrin. — Hypnum Myr.; Campylium Kindb.

Differs from the last: Leaves smaller and less distant, entire above, not spreading when dry; inner cells oblong-lanceolate; costa sometimes distinct, r. simple. Capsule smaller; lid not apiculate; cilia not appendiculate. Tufts intricate green or yellowish. Branches us. decumbent. — Rocks and logs. *Eur.* gen. r. Sweden not r.!; Myrin. Switzerl., Norway! *Amer.* Can. not r.: Macoun; Moser.

* **C.byssirameum** C. M. et Kindb. — Hypnum cat. Can. m.

Leaves very small, denticulate all around. Capsules unknown. — On base of trees r. *Amer.* Can.: Macoun.

II. Eu-Campylium.

1. Stellata.

A. Leaves very spreading; cells linear exc. the alar; costa obsolete or very short. Perichetial leaves nerveless. Dioecious not often fruiting.

5. **C. stellatum** Schreber. — Hypnum Schr.; Campylium Kindb.

Leaves not falcate, somewhat short-cuspidate (with somewhat short subulate part of the acumen), us. abruptly attenuate. Tufts us. not or sparingly radiculose, green or brown. Stem and branches us. erect, r. pinnate. — Common. *Eur.* Sweden etc.! *Amer.* Can.: Macoun. U. S.: com. Macoun.

6. **C. protensum** Bridel. — Hypnum Brid.; Campylium Kindb.

Leaves long-cuspidate gradually attenuate, the uppermost us. falcate. Stem gen. pinnate and creeping. — Not common. *Eur.* Norway, Switzerl.! Sweden: E. Nyman. France: Husnot. *Amer.* Can.: Macoun.

B. Leaves gen. not much spreading; upper cells linear, the lower us. dilated; costa often long, sometimes obsolete. Perichetial leaves plicate (as in the both last), costate. Sometimes polygamous.

7. **C. polygamum** Br. eur. — Amblystegium Br. eur.; Campylium Kindb.; Hypnum Schimper.

Leaves long-cuspidate gen. gradually attenuate, not falcate. Tufts radiculose. Stem with gen. not pinnate branches. — Not common. *Eur.* Norway, Switzerl.! Finl.: Lindberg. *Amer.* Can.: Macoun; Moser; Waghorne.

2. Chrysophylla.

A. Leaves very distant, not decurrent; cells sublanceolate exc. the alar. Monoecious.

8. **C. hygrophilum** Juratzka. — Hypnum Jur.; Campylium Kindb.; Amblystegium Schimper.

Leaves broadly ovate-lanceolate or from subovate base long-acuminate, nearly entire; costa sometimes reaching to middle. Peristomial teeth orange. Stem pinnate. Resembling *Hypnum riparium* but very much smaller. — Rare. *Eur.* Switzerl.! Finl.: Lindberg. *Amer.* U. S.: Roell.

B. Leaves crowded not spreading; cells linear, the alar nearly indistinct. Capsules unknown.

9. **C. Duriæi** Montagne. — Hypnum Mont.; C. M. syn.; Campylium Kindb.; »Orthothecium Bescherelle»: Husnot.

Leaves narrowly ovate-lanceolate long-acuminate filiform-pointed, faintly sinuolate above middle; costa very thin vanishing near middle or obsolete. Stem irregularly divided. Tufts intricate very dense. — *Eur.* r. France, Provence: Philibert.

C. Leaves spreading gen. with ovate base; alar cells distinct, the others us. linear. Dioecious.

a. Leaves nearly crowded not decurrent; angular (alar) cells few.

10.C.**chrysophyllum** Bridel. — Hypnum Brid.; Campylium Kindb.

Leaves entire (or the uppermost sinuolate) long-cuspidate; cells gen. linear exc. the us. yellow alar; costa thin reaching to middle or obsolete. Perichetial leaves costate faintly striate, abruptly narrowed. Peristome pale. Branches us. pinnate. Tufts sparingly radiculose, not much dense. — Common. *Eur.* Sweden, Norway, Switzerl.! *Amer.* Can.: Macoun; Moser; Waghorne. U. S.: Langlois, com. Cardot.

11.C.**unicostatum** C. M. et Kindb. — Hypnum cat. Canad. m.

Leaves entire shorter-acuminate than in the last; alar cells small not yellow, the others gen. linear; costa gen. distinct. Perichetial leaves costate, gradually subulate-acuminate or with filiform falcate point. Capsule smaller than in the last. Stem irregularly divided. Tufts very dense. — *Amer.* r. Can.: Macoun; Moser.

12.C.**sinuolatum** Kindb. in Hedwigia 1897 p. 47.

Leaves sinuolate short-acuminate; alar cells hyaline, the others sublanceolate; costa long somewhat thick. Stem irregularly divided. Tufts dense. Capsules unknown. — *Amer.* r. U. S. Ohio: Purpus, com. Roell.

b. Leaves decurrent entire more or less distant, recurved at base; angular cells numerous hyaline.

13.C.**decursivulum** C. M. et Kindb. — Hypnum cat. Canad. m.

Leaves from broad-ovate base long-cuspidate; costa not long. Capsule arcuate; lid apiculate; pedicel very long. Perichetial leaves costate plicate short-cuspidate filiform-pointed. Stem often pinnate. Tufts loose. — *Amer.* Can.: Macoun. *Eur.* Sweden: P. Dusén.

14.C.**bergenense** Austin. — Hypnum Aust.; Campylium Kindb.

Leaves short very small, ovate-cordate or ovate-oblong, shortly cuspidate; costa often prolonged nearly to acumen. Capsule small arcuate; pedicel not long. — *Amer.* r. U. S.: Roell; Austin, com. C. Mueller.

60. **Heterophyllon** Kindb., new genus.

A. Leaves entire somewhat large.

1.H.**Haldanei** Greville. — Hypnum Grev.

Leaves ovate-oblong acute or short-acuminate, recurved below at one side, subdecurrent, finally yellow at insertion; alar cells subquadrate (larger than in *Hypnum cupressiforme*) often hyaline, disposed on a short-triangular space, the others linear. Capsule subcylindric us. nearly straight; lid rostrate or rostellate; pedicel somewhat long. Tufts radiculose at least below, us. green sometimes golden glossy. Stem irregularly divided; branches sometimes compressed; paraphyllia numerous. Monoecious. — Logs and stones in woods. *Eur.* r. Switzerl.! France: Philibert. Germany: Schimper. *Amer.* not r. Can.: Macoun; Moser; Waghorne. U. S.: Sullivant and Schrader, com. C. Mueller.

2.**H. flaccum** C. M. et Kindb. — Hypnum cat. Canad. m.

Differs from the last: Leaves narrower, ovate-lanceolate; alar cells larger. Stem subpinnate; branches cuspidate often compressed. Dioecious. Capsules unknown. — Rocks and logs r. *Amer.* Can.: Macoun; Moser; Waghorne.

B. Leaves large, strongly serrate at acumen.

3.**H. nemorosum** Koch. — Hypnum Koch.

Leaves ovate-lanceolate, recurved below, crowded and not decurrent, yellow at insertion; apical cells lanceolate, alar large subquadrate hyaline or orange on a nearly round space; other cells linear. Stem-leaves nearly entire below the subulate acumen. Branch-leaves denticulate above middle, with sublinear somewhat broad half-twisted point. Capsule large suboblong or arcuate; lid acute; pedicel long. Tufts pale green, sparingly radiculose. Stem pinnate; branches cuspidate not compressed. Monoecious. Habit of *Calliergon cuspidatum.* — Trees and logs in woods r. *Eur.* Germany: Milde. *Amer.* »U. S.»: Lesquereux.

C. Leaves small, minutely denticulate at acumen.

4.**H. pseudo-nemorosum** Kindb. n. sp.

Leaves ovate-oblong denticulate at the subulate acumen, not distinctly recurved, decurrent, not yellow at insertion; alar cells small few dusky on a short-triangular space; apical cells lanceolate, the inner linear-lanceolate. Tufts glossy velvet-like. Stem subpinnate; branches faintly compressed; paraphyllia broad not numerous. Capsules unknown. Habit of *Pylaisiella velutina.* — *Amer.* r. Can. N. Brunswick: Moser, com. Macoun.

5.**H. subadnatum** C. M. et Kindb. — Raphidostegium cat. Can. m.

Leaves ovate-oblong short-acuminate acute, denticulate above middle, recurved below, not decurrent; alar and lower marginal cells quadrate, the others suboblong as in *Amblystegium.* Perichetial leaves serrate longer acuminate. Capsule cylindric arcuate strangulate; lid large rostellate; peristome not seen; pedicel flexuous deflexed arcuate. Tufts dense green. Stem creeping not pinnate; branches subjulaceous often incurved at the tops; paraphyllia broad. Probably monoecious. — Trees r. *Amer.* Can.: Macoun; Dearness, com. Macoun.

61. **Myurium** Schimper.

1.**M.Boscii** Schwægrichen. — Hypnum Schw.; Sulliv. icon. m.; Myurium Kindb.

Leaves large very concave not decurrent, from ovate-cordate not recurved base abruptly narrowed to a subulate often twisted point, striate, denticulate all around; alar cells few suboval or irregular, lower basal often brownish, the others sublinear; costa simple vanishing above middle or short and double. Capsule large oblong-oval curved; annulus broad; segments nearly split; cilia 3 not much shorter, not appendiculate; pedicel 2—3 centim. long. Perichetial leaves abruptly long-subulate. Stem subpinnate or irregularly divided; branches robust turgid. Dioecious r. fruiting. — Earth in woods. *Amer.* U. S. »not uncommon«: Sullivant. Austin, com. Macoun; Sullivant, com. C. Mueller; Fitzgerald, com. Renauld.

* **M.coloradense** Austin. — Hypnum Aust.; Myurium Kindb.

Cells of branch-leaves often oval-oblong princ. the upper, sometimes also the angular. Capsules unknown. — *Amer.* r. U. S. Arkansas Hot Springs: Ch. Roell, com. J. Roell.

2.**M.Hebridarum** Schimper.

Differs from *M. Boscii*: Leaves narrower, from ovate-oblong or oblong-linear base more abruptly contracted to the point, not striate; costa indistinct. Capsules unknown. — Rocks near sea r. *Eur.* Scotl.: Fergusson, com. Husnot (Africa, Madeira: G. Fritze, com. Roell and Kaurin).

62. **Hypnum** L.; Dillenius; in part.

A. Leaves with simple (sometimes in *H. Bambergeri* short and double) costa. Dioecious or (in *H. fluviatile* and sometimes in *Harpidium*) monoecious.

a. Leaves (exc. *H. erythrorhizon* and *H. harpidioides*) not recurved at borders.

I. **Alaria**. Leaves (princ. the youngest) mamillose above, us. striate; middle cells often dilated, alar often yellow; costa thick. Stem us. pinnate; paraphyllia present. Leaves falcate.

II. **Cratoneuron.** Leaves not mamillose, gen. not striate; middle cells gen. dilated, alar gen. distinct but r. yellow; costa gen. thick. Stem us. not pinnate, r. with paraphyllia. Leaves sometimes not falcate.

III. **Harpidium.** Leaves gen. not mamillose, in few species striate; cells gen. narrow exc. the gen. hyaline or sometimes not distinct alar; costa gen. not thick. Stem us. not radiculose, sometimes pinnate; paraphyllia wanting. Leaves (in few species) sometimes not falcate.

aa. Alar leaf-cells not distinct.

1. **Riparia**. Leaves gen. straight subdistichous; lower basal cells nearly uniform subquadrate in 2—5 rows. Monoecious often fruiting. Stem often radiculose. — Growing princ. on logs in water.

2. **Revolventia.** Leaves falcate; lower basal cells gen. few, short and dilated. Sometimes monoecious. Stem not radiculose. Leaves often reddish. — Growing in swamps.

bb. Alar leaf-cells distinct.

3. **Adunca**. Leaves not r. straight (princ. in *H. fluitans*, *H. exannulatum* and *H. elodes*), r. plicate when moist. Us. dioecious, not often fruiting. Stem r. radiculose. Leaves sometimes (princ. in *H. exannulatum*) reddish. — Growing in swamps.

4. **Uncinata**. Leaves us. falcate, gen. plicate. Us. monoecious, often fruiting. Stem r. radiculose. Leaves greenish. — Growing on dry stones, base of trees and dry earth, r. in water.

b. Leaves recurved at borders below, subundulate when dry.

IV. **Rhytidium**. Leaves faintly rough above at both sides, falcate or nearly straight; alar (angular) cells small very numerous. Stem without rhizoids and paraphyllia.

B. Leaves with short double or indistinct (in *H. resupinatum* sometimes simple) costa, falcate or (sometimes in *H. cupressiforme*) straight, sometimes (in subg. *Cupressina* and *Campylophyllum*) recurved at borders. Stem sometimes (in *Cupressina*) with paraphyllia. Dioecious or monoecious.

V. **Pseudo-Hylocomium**. Leaves spreading when dry, large denticulate not circinnate, us. plicate below; special alar cells not defined. Stem not or irregularly pinnate, not creeping. Dioecious.

VI. **Campylophyllum**. Leaves spreading when dry, small faintly denticulate subcircinnate not plicate; alar cells small distinct. Stem pinnate creeping. Monoecious.

VII. **Drepanium.** Leaves not spreading when dry, large nearly entire not circinnate, sometimes striate or plicate; alar cells either large or not well-defined. Stem not plumiform, often irregularly divided. Dioecious or r. monoecious.

VIII. **Cupressina.** Leaves not spreading when dry, mostly small (in few species large), not r. denticulate and circinnate, not (exc. *H. plicatile* and *H. crista castrensis*) plicate; alar cells gen. distinct r. large. Stem often pinnate. Sometimes monoecious.

a. Leaves (at least the elder of stem) yellow (r. red or brown) at insertion, gen. small, in *Imponentiformia* somewhat large.

aa. Leaves recurved nearly to acumen, often circinnate.

1. **Plicatilia.** Leaves plicate. Stem eradiculose often irregularly divided; paraphyllia none. Capsule long narrow; pedicel long. Dioecious very r. fruiting.

2. **Reptiliformia.** Leaves not plicate. Stem us. creeping and pinnate; paraphyllia r. (in *H. canariense*) present. Capsule not long; pedicel shortish. Monoecious us. fruiting.

bb. Leaves not distinctly recurved and not plicate. Dioecious or monoecious.

3. **Imponentiformia.** Leaves somewhat large often circinnate. Stem pinnate us. with paraphyllia. Habit of *H. cupressiforme.*

4. **Callichroidea.** Leaves small circinnate. Stem often plumiform r. with paraphyllia.

5. **Raphidostegioidea.** Leaves small not circinnate. Stem not regularly pinnate; paraphyllia none.

b. Leaves pale at insertion, often (princ. in *Cupressiformia*) large.

aa. Leaves circinnate. Paraphyllia sometimes numerous.

6. **Molluscoidea.** Leaves not recurved sometimes large. Stem us. plumiform gen. not or sparingly radiculose. Dioecious.

7. **Hamulosa.** Leaves small sometimes recurved. Stem not plumiform, us. creeping; paraphyllia us. broad. Us. monoecious.

bb. Leaves not circinnate. Stem not plumiform; paraphyllia few or wanting.

8. **Cupressiformia.** Leaves short-acuminate often large, sometimes recurved. Stem sometimes pinnate. Dioecious.

9. **Amblystegioidea.** Leaves small long-acuminate not recurved. Stem irregularly divided or subpinnate. Monoecious.

I. Alaria C. Mueller mscr.

A. Leaves distant decurrent, more denticulate at base; alar cells large.

1. **H. commutatum** Hedwig.

Leaves from broad-ovate base long-acuminate, gen. striate, faintly mamillose above; upper cells narrow, the lower dilated, the alar yellow; costa vanishing in acumen. Capsule large subcylindric arcuate; lid rostellate-apiculate; pedicel very long. Perichetial leaves plicate. Tufts loose. Stem pinnate very tomentose; branches distant; paraphyllia numerous. — Wet calcareous places. *Eur.* common below alp. regions. Sweden, Norway, France, Switzerl.! *Amer.* r. »U. S.»: Lesq. et. Jam.

* **H.sulcatum** Schimper.

Stem less regularly pinnate; branches less distant. Leaves smaller, short-decurrent; their costa shorter. Capsule smaller. — Alpine, often not calcareous, stations. *Eur.* somewhat r. Norway, Switzerl.! *Amer.* r. »Greenl.»: Berggren. N. Foundl.: Waghorne.

2.**H.decipiens** Notaris. — Thuidium Not.; Hypnum Kindb.

Differs from *H. commutatum:* Leaves gen. mamillose on both sides, with broader base and shorter acumen, less striate; alar cells gen. hyaline; cells shorter, those of branch-leaves oval-oblong; costa shorter, faint above. Perichetial leaves shorter, faintly striate. Stem often sparingly tomentose; branches often simple above. Very r. fruiting. — Rivulets, princ. in alps, also in not calcareous districts, gen. r. *Eur.* Sweden, Norway, Switzerl.! *Amer.* Can.: Macoun; Waghorne.

B. Leaves crowded, not decurrent, nearly entire; alar cells not large.

3.**H.falcatum** Bridel.

Leaves from ovate-oblong base long-acuminate, often striate, indistinctly mamillose, cells sublinear; costa us. vanishing in acumen. Perichetial leaves plicate. Capsule less large than in *H. commutatum*; lid with shorter point. Tufts brown or dark green, often dense. Stem us. irregularly pinnate and sparingly tomentose; branches approached. — Swamps and rivulets princ. in not calcareous alp. stations. *Eur.* common in alps. Sweden, Norway, France, Switzerland! *Amer.* Can. not r.: Macoun.

* **H.irrigatum** Zetterstedt. — H. virescens Boulay.

Leaves ovate-lanceolate faintly striate; alar cells us. not well-defined; costa of stem-leaves gen. percurrent. Tufts dirty greeen. Stem often pinnate, sometimes naked below; paraphyllia few. Very r. fruiting. — Rivulets r. *Eur.* Sweden, Norway, Switzerl.!

II. Cratoneuron Sullivant, in part.

1.**H.filicinum** L. — Amblystegium Notaris.

Leaves minutely denticulate all around; alar cells large us. hyaline; costa not thin in the acumen, sometimes excurrent.

Stem-leaves subovate acuminate decurrent. Branch-leaves narrower, gen. more crowded; cells suboblong. Perichetial leaves gen. not striate. Capsule subcylindric arcuate, smaller and shorter-pedicellate than in *H. commutatum*. Tufts us. dense and dirty green. Stem often creeping; branches us. crowded; paraphyllia often present. Dioecious. — Wet places, common. *Eur.* Sweden, Norway, Germany, Switzerl.! *Eur.* Can. Macoun.

* **H.curvicaule** Juratzka.

Leaves gen. not falcate; alar cells yellow; stem-leaves short-acuminate. Stem nearly eradiculose. — Alps r. *Eur.* Norway: Bryhn; E. Nyman. Austria: Breidler. Switzerl.: Culmann.

* **H.Vallis-clausæ** Bridel. — Hypnum Formianum Schimper.

Leaves long-acuminate; cells less dilated; costa excurrent. Stem long, often denudate below and covered by persistent nerves. — Running water r. *Eur.* »France»: Boulay. »Italy»: Schimp. syn.

* **H.fallax** Bridel. — Amblystegium irriguum var. spinifolium Schimper.

Upper leaves ovate-lanceolate long-acuminate nearly entire; costa excurrent. Stem as in the last. — Running water r. *Eur.* Sweden! Engl.: Rogers. Germany: Roemer.

5. **H.fluviatile** Swartz. — Amblystegium Br. eur.

Leaves gen. entire, ovate-oblong or ovate-lanceolate, acute or short-acuminate, not or indistinctly decurrent, us. not falcate and not distant, dark green; cells lanceolate-oblong, the small alar gen. not much distinct; costa subpercurrent. Capsule as in the last. Stems not or sparingly radiculose, gen. irregularly divided and not tufted; branches long; paraphyllia none. Very r. fruiting. — Inundated rocks. *Eur.* not r. Sweden, Germany! *Amer.* Can.: Macoun. U. S. r.: Austin.

* **H.irriguum** Hooker et Wilson. — Amblystegium Br. eur.

Leaves sinuolate-denticulate, from subovate base long-acuminate, subdecurrent, somewhat distant and patent; alar cells distinct; costa subexcurrent. Stem us. rigid when dry. — *Eur.* not common. Sweden, Germany, Switzerl.! *Amer.* Can.: Macoun; Waghorne. U. S.: Austin.

III. Harpidium Sullivant.

1. Riparia.

6. **H.riparium** L. — Amblystegium Br. eur.

Leaves ovate-lanceolate gradually acuminate sometimes filiform-pointed, entire, scarcely decurrent, us. distant and large; middle cells, also often the upper, narrowly linear; costa r. percurrent.

Capsule large arcuate; annulus broad; lid subobtuse; pedicel long. Tufts us. green. — Gen. common, r. in alp. regions. *Eur.* Sweden, Switzerl.! *Amer.* Can.: Macoun. U. S.: Roell.

* **H.longinerve** Kindb. cat. Can. m.

Leaves mostly curved; costa gen. long-excurrent. Tufts sometimes brown. — Rare. *Amer.* Can.: Macoun.

* **H.Kochii** Br. eur. — H. curvipes Guembel; Amblystegium Schimp. syn.

Leaves oval-oblong gen. straight; middle cells lanceolate. — Rare. *Eur.* France: Berthoumieu. *Amer.* Can.: Macoun.

7.**H.vacillans** Sullivant. — Amblystegium Sull. icon. m.; Hypnum Lesq. et Jam.

Differs from *H. riparium*: Leaves not large, those of branches often obtusate with oblong apical cells, the perichetial with excurrent costa. Capsule small more strangulate; lid obtuse; pedicel thin and short. — R. *Eur.* France, Calvados: Brébisson (Husnot M. Gall. n. 393). *Amer.* Can. Owen Sound: Macoun. U. S.: Roell; N. Jersey: com. Macoun.

2. Revolventia.

8.**H.revolvens** Swartz.

Leaves circinnate, from short subovate base narrowed to the longer acumen, not striate, entire and not decurrent, us. reddish; cells linear exc. the wider (lower) basal; costa gen. vanishing below acumen. Capsule large arcuate; annulus broad; lid apiculate; pedicel gen. long. Stem irregularly pinnate. Monoecious not r. fruiting. — Alpine princ. northern districts. *Eur.* Norway (common)! Sweden: Lindberg; M. Huss. England: Holt. France: Husnot. *Amer.* r. Alaska: J. M. Macoun. Greenl.: Berggren; Vanhoeffen. Can.: Macoun; Waghorne.

9.**H.Cossoni** Schimper. — H. intermedium Lindb.

Differs from the last: Leaves not circinnate, their acumen not longer than the us. subovate base. Tufts green or brown-yellow. Dioecious r. fruiting. — *Eur.* princ. in northern districts. Sweden, Norway, Switzerl.! *Amer.* r. Can.: Macoun.

* **H.vernicosum** Lindberg.

Leaves shorter and broader, short-acuminate, striate when dry; costa often short. Stem us. pinnate. Tufts us. yellowish. — *Eur.* Sweden!; Lindberg. Norway! *Amer.* r. Can.: Macoun.

* **H.rigidum** Kindb. enum. bryin. dovr. (as var.)

Leaves larger with narrowly ovate-oblong base, brown-green. Stem somewhat rigid when dry. Capsules not found. — Alp. region r. *Eur.* Norway!

3. Adunca.

A. Tufts densely cohering. Leaves not decurrent; alar cells small or indistinct. Dioecious r. fruiting.

a. Angular leaf-cells finally red, the alar often distinct; costa often short and double.

10.**H.Bambergeri** Schimper. — H. brevifolium Lindb.; H. flexuosum Berggren.

Leaves falcate, from ovate or broad-ovate base tapering to a longer or shorter acumen, entire and crowded; upper cells linear. Capsule arcuate not large; lid apiculate; pedicel not long. Tufts either green, sometimes glossy, or brown-green or brown-red. — Swamps and wet rocks in alps r. *Eur.* Norway!; E. Adlerz (fruiting). *Amer.* »Greenl.»: Berggren. »Can.»: Lesq. et Jam.

b. Alar leaf-cells nearly indistinct, not red; costa simple.

11.**H.elodes** Spruce. — Amblystegium Schimper.

Leaves small us. straight, more or less distant; cells linear; costa vanishing in acumen, not thick. Stem-leaves from short broad base short-cuspidate or filiform-pointed, faintly denticulate below. Branch-leaves narrowly ovate-lanceolate long-cuspidate, faintly denticulate nearly all around, sometimes falcate. Capsule small oblong-cylindric curved; pedicel short. Tufts blackish or dark green, sparingly radiculose. — *Eur.* gen. r. Sweden, Norway!

* **H.densum** Milde. — Brachythecium Juratzka.

Leaves smaller, more distinctly denticulate; cells often suboblong; costa subexcurrent. Capsules not seen. — *Eur.* r. Austria: Juratzka, and Germany: Arnold (herb. Hartman), com. Acad. Upsal.

12. **H.subsecundum** Kindb. rev. bryol. 1895.

Leaves not large, nearly crowded, entire; cells linear, the lower basal yellow; costa vanishing below acumen. Stem-leaves from broad-ovate base short-acuminate; costa very thick. Branch-leaves from subovate base (more or less gradually) long-subulate, subsecund when dry; costa thinner. Capsule arcuate; pedicel short; teeth brownish. Stem creeping. — *Amer.* r. Can.: White, com. Macoun; N. Foundl.: Waghorne.

B. Tufts loose eradiculose. Leaves not or shortly decurrent, gen. falcate; alar cells small, other cells linear. Capsule annulate. Dioecious r. fruiting.

a. Leaves plicate when dry, not decurrent. Stem irregularly divided.

13.**H.lycopodioides** Schwægrichen.

Leaves entire large crowded shining; costa reaching to the acumen, often brown. Stem-leaves from subovate or ovate-oblong base tapering to a shorter, subulate filiform-pointed acumen. Branch-leaves gen. ovate-lanceolate longer-acuminate. Capsule large arcuate; teeth pale; pedicel 3—5 c. m. long. Tufts yellowish or brown. — Gen. r. *Eur.* Sweden! England: Holt. France: Husnot. *Amer.* »Greenl.»: Berggren. »U. S.»: Lq. et Jam.

b. Leaves short-decurrent not plicate. Stem us. subpinnate.

14.**H.aduncum** L.; Hedwig; Schimper.

Leaves crowded not large, from subovate base tapering to a longer sometimes denticulate acumen, r. ovate-lanceolate. Capsule small; pedicel not long. Tufts green or yellowish. — *Eur.* probably not r. Norway fruiting! Germany: Schimper (com. as »the typical *H. aduncum*»). *Amer.* r. U. S. Roell. Can.: Macoun; Waghorne.

15.**H.Wilsoni** Schimper.

Leaves distant large, from ovate lanceolate base tapering to a shorter gen. entire acumen. Capsule large slightly curved; pedicel very long. Tufts dusky green. — R. *Eur.* Engl. Southport near sea, fruiting: G. A. Holt; T. Rogers. Sweden, isl. Gothland: Zetterstedt, com. E. Haglund. *Amer.* U. S.: Roell.

C. Tufts loose eradiculose. Leaves long-decurrent not striate, often not falcate; alar cells large.

a. Capsule large not (exc. *H. capillifolium*) annulate; pedicel very long. Leaves gen. long and narrow; cells linear exc. the alar; costa us. long. Sometimes monoecious, less r. fruiting.

16.**H.fluitans** L.

Leaves from narrowly ovate-oblong or ovate-lanceolate base tapering to a gen. longer acumen, us. entire and green. — *Eur.* common below alps, r. in alp. regions. Sweden, Norway! *Amer.* Can.: Macoun. Greenl.: Berggren.

17.**H.capillifolium** Warnstorf.

Differs from the last: Costa of leaves gen. long-excurrent. »Capsule annulate»: Renauld. — *Eur.* r. Norway! Germany: Warnstorf.

18.**H.exannulatum** Guembel.

Leaves from ovate-lanceolate base tapering to a gen. shorter acumen, us. denticulate below and reddish or brown, r. green, often very distant. — *Eur.* common in northern districts, princ. in alp. regions, r. in southern districts. Sweden, Norway! *Amer.* Can. not r.: Macoun; Waghorne. Greenl.: Berggren.

* **H.pseudo-stramineum** C. Mueller.

Leaves green entire often straight; those of branches often with oblong apical cells. Capsules not seen. — R. *Eur.* Sweden: E. Adlerz. Germany: Milde. *Amer.* Can.: Waghorne.

b. Capsule annulate not large; pedicel often short. Leaves often short and broad; cells often dilated; costa mostly short. Dioecious r. fruiting. Tufts not reddish.

19.**H.Kneiffii** Schimper.

Leaves entire (or minutely denticulate above), from subovate or broad-ovate base tapering to a gen. longer but broad and short-subulate acumen, us. small and distant; cells often dilated; costa us. short, sometimes bifid. Capsule more or less arcuate; pedicel 2—5 c. m. long. Tufts green. — *Eur.* not r. Sweden, Norway! *Amer.* Can.: Macoun.

* **H.Sendtneri** Schimper, in part; Boulay.

Leaves larger less distant, us. brown-green; cells gen. narrow, the alar often yellowish. — *Eur.* Sweden!; C. O. Hamnstrœm (determ. Lindberg); E. Adlerz. *Amer.* r. Can.: Macoun.

20.**H.conflatum** C. M. et Kindb. cat Can. m.

Leaves small distant denticulate all around; those of stem from round-ovate base tapering to a shorter subobtuse acumen; branch-leaves oblong-lanceolate; cells gen. dilated; costa gen. vanishing in acumen, sometimes indistinct. Capsule smaller than in the last, strangulate; lid low apiculate; pedicel very long and capillary. Tufts green. — *Amer.* r. Alaska: J. M. Macoun. Can.: Macoun, Canad m. n. 334; Waghorne.

21.**H.hamifolium** Schimper.

Leeves large crowded entire, from ovate-oblong base tapering to a longer narrow-subulate acumen; cells linear; costa long. Tufts yellowish. Branches robust, rigid when dry. Capsules unknown. — *Eur.* r. Germany near Breslau: Schulze, com. Warnstorf. *Amer.* »U. S.»: Renauld.

4. Uncinata.

A. Leaves not recurved, entire at least below.

22.**H.uncinatum** Hedwig. — H. aduncum Lindb.

Leaves short-decurrent from narrowly ovate base tapering to an often filiform-pointed acumen, us. striate; alar cells large, the others linear; costa us. long. Capsule cylindric arcuate or nearly straight, strangulate; lid apiculate; pedicel us. 3—4 c. m. long. Tufts us. green and eradiculose. Stem often pinnate. Monoecious us. fruiting. — Gen. common. *Eur.* Sweden, Norway, Germany, Switzerl.! *Amer.* Can.: Macoun; Waghorne. Greenl.: Berggren. U. S.: Howell, com. Cardot.

* **H.Moseri** Kindb. cat. Canad. m.

Stem creeping. Leaves small gen. not striate; costa thin often obsolete Capsule small; pedicel us. short. — *Amer.* Can.: (N. Brunsw., Labrador and N. Foundl., frequent): Moser; Waghorne. *Eur.* Sweden: E. Nyman.

23.**H.orthothecioides** Lindberg

Differs from *H. uncinatum*: Leaves not decurrent, gen. with broader base, often straight; alar cells gen. small. Dioecious. Tufts us. yellowish. Capsules and female flowers unknown. — Earth and rocks in northern districts. *Eur.* not r. in arctic districts. Spetsbergen: Berggren. Sweden: Arnell. Finland: Brotherus. *Amer.* Alaska: J. M. Macoun. Can.: Waghorne.

B. Leaves recurved, denticulate nearly all around (at least those of branches). Dioecious.

24.**H.erythrorhizon** Schimper. — Brachythecium Sch.; Hypnum Hartman.

Leaves faintly striate crowded decurrent not large, often corrugate when dry; alar cells hyaline somewhat large, the others lanceolate oblong; costa reaching to acumen. Stem-leaves nearly entire from ovate or ovate-oblong base abruptly long-acuminate, faintly but broadly recurved nearly to acumen. Branch-leaves broadly ovate-lanceolate faintly denticulate nearly all around. Capsule not large suboblong or arcuate; lid acute; pedicel short smooth. Stem subpinnate creeping. Tufts not glossy pale green or green. — Granite rocks in woods in northern districts r. *Eur.* Sweden: Aongstrœm; Arnell; J. Persson. *Amer.* »U. S.« Cardot.

* **H.Thedenii** (Hartman as var.) Br. eur. — Brachythecium Br. eur.; Hypnum (Hartman) Kindb.

Leaves subplicate less crowded. Stem longer, more regularly pinnate. Capsule oval. — Rocks r. *Eur.* Sweden: K. F. Thedenius, com. R. Hartman. *Amer.* »U. S.«: James.

25.**H.harpidioides** C. M. et Kindb. — Brachythecium Cat. Can. m.

Differs from *H. erythrorhizon:* Leaves plicate distinctly denticulate all around and more distinctly falcate, from ovate base subulate-acuminate recurved to acumen; alar cells large green, the others lanceolate. Capsule round-oval; pedicel slightly rough above. Stem not creeping. — Logs in woods r. *Amer.* Can.: Macoun; Moser.

IV. Rhytidium Sullivant.

26.**H.rugosum** Ehrhart.

Leaves large denticulate nearly all around from subovate base gen. long-subulate; costa vanishing near or above middle. Capsule subcylindric arcuate; teeth ferruginous; lid acute or rostellate; pedicel not long. Tufts loose, brown below, golden glossy or greenish above. Branches subjulaceous very thick. Dioecious r. fruiting. — Dry earth and rocks. *Eur.* common in alps, r. in lower districts. Norway fruit., Switzerl.! Germany fruit.: Schimper. *Amer.* Can.: Macoun; Waghorne.

V. Pseudo-Hylocomium Kindb.

A. Angular leaf-cells large numerous hexagonal-oval.

27.**H.squarrosum** L. — Hylocomium Br. eur.

Leaves minutely denticulate all around from ovate base long-acuminate; angular cells sometimes brown. Perichetial leaves pale yellow gradually acuminate filiform-pointed, serrate above middle of the basal part. Capsule broad-oval or obovate or curved us. not large; teeth brown-yellow; cilia often appendiculate; lid acute; pedicel very long. Stem eradiculose r. pinnate. Tufts us. dirty greenish. — Humid meadows. *Eur.* gen. common below alp. regions. Sweden, Switzerl.! *Amer.* not common. Alaska: J. M. Macoun. Can.: J. Macoun. U. S.: Roell (forma subpinnata).

B. Angular leaf-cells suboblong small not well-defined.

28.**H.loreum** L. -- Hylocomium Br. eur.

Leaves from ovate base long-acuminate. Stem-leaves entire below middle; branch-leaves denticulate nearly all around. Perichetial leaves hyaline, slightly denticulate above. Capsule large oval or subglobose; teeth brown; cilia not appendiculate; pedicel long. Stem often very long and decumbent; branches radiculose. — Earth and rocks princ. near sea or larger lakes not r. *Eur.* Sweden, Norway, Germany! *Amer.* Alaska: J. M. Macoun. Can.: Macoun; Dawson.

29.**H.robustum** Hooker. — Hylocomium Flemmingii Austin.

Leaves ovate short acuminate denticulate, rugose when dry, larger than in the both last and less curved; the younger narrower, the elder often covered by hair-like rhizoids. Capsule large subobovate oblique or slightly curved; teeth yellow or finally ferruginous; lid conic obtuse; pedicel shortish. Stem suberect; branches few distant very thick us. green. Habit of *Hypnum rugosum* but larger. — Earth in woods r. *Amer.* western slope. Can.: Macoun. U. S.: Leiberg, com. Mrs Britton.

VI. Campylophyllum Schimper.

30.**H.Halleri** L. fil. — H. Macounii Kindb. bull. Torr. club XVII.

Leaves faintly denticulate nearly all around, from suboval suberect recurved base acuminate; alar cells not numerous, the others oblong-lanceolate or sublinear. Branch-leaves more distinctly denticulate. Capsule small narrow cylindric more or less curved, faintly constricted; lid obtuse; pedicel not long. Tufts dense often brown. — Rocks princ. calcareous. *Eur.* nearly common in dolomitic alps. Sweden, Norway, Switzerl.! *Amer.* r. Can.: Macoun; Drummond. N. Foundl.: Waghorne.

VII. Drepanium Schimper, in part.

A. Leaves finally yellow at insertion.

a. Leaves decurrent falcate not undulate.

31.**H.curvifolium** Hedwig; Sullivant icon. musc.

Leaves nearly entire, faintly striate; alar and lowest basal cells nearly uniform more or less dilated but not large, the others linear. Stem-leaves subovate short-acuminate; branch-leaves ovate-oblong or ovate-lanceolate acuminate acute. Capsule large subobovate or arcuate, strongly striate and not strangulate when dry; teeth yellow; cilia not appendiculate; pedicel thick, 5—6 c. m. long. Stem gen. pinnate, not or very sparingly radiculose; branches straight faintly compressed. Tufts green. Pseudo-monoecious not r. fruiting. — On decayed logs in shady woods. *Amer.* common. Can.: Macoun; Moser. U. S.: Sullivant, com. C. Mueller; Fitzgerald, com. Renauld.

32.**H.pseudo-drepanium** C. M. et Kindb. cat. Can. m.

Differs from the last: Leaves entire plicate less distinctly decurrent, shorter acuminate; alar cells large. Stem irregularly divided; branches long turgid arcuate at apex. Capsule as in the last. — Logs in woods r. *Amer.* Can.: Macoun.

33.**H.Renauldi** Kindb. cat. Canad. m.

Differs from *H. curvifolium*: Leaves gen. entire; alar cells large. Stem not pinnate; branches more compressed or complanate. Capsule faintly striate. Habit of *H. pratense.* — On rocks or sand r. *Eur.* Norway in Dovrefjeld and Gudbrandsdal etc.! *Amer.* Can.: Macoun.

b. Leaves not or slightly decurrent, often undulate and straight; lowest basal cells suboval nearly similar.

34.**H.pratense** Koch.

Leaves gen. entire and not striate, often straight, less crowded than in *H. curvifolium*, undulate when dry; cells linear except the lowest basal. Stem-leaves subovate with often subulate acumen; branch-leaves ovate-lanceolate. Capsule small strangulate not striate; pedicel thin 3—5 c. m. long. Stem flaccid not pinnate and not creeping; branches complanate often long and simple, sometimes loosed from the stem. Tufts often whitish green. Habit of *Plagiothecium undulatum*. Dioecious or pseudo-monoecious, very r. fruiting. — Swamps and wet meadows r. *Eur.* Sweden and Norway!; E. Nyman (fruiting). Germany: Schimper (fruit.). *Amer.* Can.: Macoun; Drummond n. 196; Moser.

* **H. subflaccum** C. M. et Kindb. cat. Can. m.

Leaves striate gen. ovate-oblong, denticulate above to ¼, straight; those of stem short-decurrent; alar cells more distinct. Tufts green. Capsules unknown. — Swamps r. *Amer.* Can.: Macoun.

35. **H. pseudo-pratense** Kindb. cat. Can. m.

Differs from *H. pratense*: Leaves not undulate, more crowded and more distinctly denticulate above. Stem creeping; branches short; tufts very dense and green. Monoecious. Capsules unknown. — Logs in woods r. *Amer.* Can.: Macoun.

B. Leaves pale not yellow at insertion, decurrent and not undulate. Branches not compressed.

36. **H. Lindbergii** Mitten. — H. arcuatum Lindb., non Sulliv.

Leaves as in *H. curvifolium* but gen. entire; alar cells large hyaline. Capsule large curved strongly plicate not strangulate; teeth yellow; cilia long-appendiculate; pedicel thick 5—6 c. m. long. Stem irregularly divided eradiculose. Tufts us. dirty green. Dioecious very r. fruiting. — On clayey earth. *Eur.* not r., nearly common in northern districts. Sweden!; S. O. Lindberg; E. Collinder (fruiting). Norway!; E. Nyman (fruit.). Switzerl., Italy! *Amer.* r. Can: Macoun; Moser; Waghorne.

37. **H. arcuatiforme** Kindb. cat. Canad. m.

Differs from the last: Leaves shorter, ovate-oblong. Capsule small strangulate not striate; teeth pale yellow; pedicel 3 c. m. long. Stem subpinnate creeping. Agrees with the last in appendiculate cilia of endostome. Habit of *H. cupressiforme*. — On earth in woods r. *Amer.* Can.: Macoun.

VIII. Cupressina C. Mueller, in part.

1. Plicatilia.

38. **H. plicatile** Mitten. — Stereodon Mitt.; Hypnum Lesq. et Jam.

Leaves not decurrent; upper cells lanceolate, alar small finally hyaline, the others oblong. Stem-leaves suboval short-acuminate entire. Branch-leaves from oval-oblong base tapering to an often longer and serrulate, sometimes circinnate acumen. Capsule cylindric-oblong more or less curved, finally striate, somewhat large; lid acute. Tufts brown-green. Branches subjulaceous. R. fruiting. — Rocks in alp. region r. *Eur.* Norway less r.! Austria: Milde. France: Boulay. Spetsbergen: R. Gyllencreutz. *Amer.* Can. fruiting: Macoun. U. S.: Roell, com. Cardot.

***H.revolutum** Mitten. — Stereodon Mitt.; Hypnum Lindberg; H. Heufleri Juratzka, in part.

Leaves not circinnate, those of branches shorter-acuminate often entire. Capsules not seen. — *Eur.* Norway!

2. Reptiliformia.

A. Stem pinnate creeping; paraphyllia wanting or very few. Branch-leaves denticulate; inner basal cells yellow.

a. Stem-leaves entire at least below. Capsules and leaves somewhat large. Tufts green.

39.**H.reptile** Michaux; Schimper. — Leskea pallescens Hedwig; Hypnum Beauvois; C. Mueller.

Stem-leaves entire or ovate-oblong short-acuminate or filiform-pointed; branch-leaves narrowly ovate-oblong or ovate-lanceolate, entire above and at acumen, often circinnate; alar cells small distinct finally brown-orange, impressed at angles on a short-triangular space; the others sublinear. Capsule pale red; teeth pale yellow; segments subhyaline; lid short-pointed; pedicel not long. — Trees and stumps not r. *Eur.* Sweden, Switzerl.! Germany: Milde. Austria: Progel. *Amer.* Can.: Macoun; Moser; Waghorne.

40.**H.reptiliforme** Kindb. revue bryol. 1895.

Differs from the last: Leaves larger, long-acuminate; those of stem ovate-oblong denticulate above, those of branches ovate-lanceolate denticulate all around; alar cells large hyaline. Capsule pale yellow; segments yellow; lid not seen; pedicel longer. — *Amer.* r. Can.: Macoun.

b. Leaves denticulate all around.

aa. Branches subjulaceous us. brown. Leaves short; cells somewhat wide.

41.**H.perichætiale** Br. eur.

Leaves subovate acute or sometimes short-acuminate; alar cells small dusky on a narrow-triangular space, the others lanceolate-oblong. Capsule finally brown; pedicel short. — Rocks r. *Eur.* Norway: Kaurin. *Amer.* Can.: Macoun.

bb. Branches green not julaceous. Branch-leaves long often circinnate; cells narrow.

42.**H.pseudo-fastigiatum** C. M. et Kindb. cat. Can. m.

Stem-leaves broad-ovate abruptly narrowed to a long filiform point, decurrent; branch-leaves ovate-lanceolate; alar cells small distinct finally brownish. Capsule pale red; lid rostellate; pedicel short. — Trees r. *Eur.* Norway near Lillehammer! Sweden: H. Nordenstrœm. *Amer.* Can.: Macoun.

43.**H.micro-reptile** Kindb. revue bryol. 1895. — H. reptile C. M. syn., not Michaux; H. pallescens Schimp. syn., not Beauvois, also not Leskea pallescens Hedwig.

Leaves and capsules smaller than in the 4 last species. Leaves ovate-lanceolate circinnate with long subulate acumen; alar cells small few hyaline. Capsule finally brown; lid and pedicel as in the last. — Rocks and trees. *Eur.* r. Germany: Milde. *Amer.* not r. Can.: Macoun; Moser; Fowler; Waghorne. U. S.: Green, com. Cardot.

B. Stem irregularly divided sparingly radiculose; paraphyllia filiform numerous. Branch-leaves gen. entire below acumen; lower basal cells often pale finally orange.

44.**H.canariense** Mitten. — Stereodon Mitt.; Hypnum Kindb.; H. Waghornei Kindb. cat. Canad. m.

Leaves long-acuminate ovate-lanceolate circinnate; alar cells small dusky numerous, the others narrow. Capsules not seen; pedicel not long. — Trees and humid rocks r. *Eur.* Irel. near Killarney: Lindberg, com. Braithwaite. *Amer.* N. Foundl.: Waghorne.

3. Imponentiformia.

A. Tufts nearly eradiculose us. brown. Leaves dark-brown at insertion, long-acuminate; alar cells not large. Capsule narrow; lid long-conic rostellate. R. fruiting.

45.**H.imponens** Hedwig.

Leaves us. not recurved; alar cells on a short-triangular space, the others linear. Stem-leaves entire from ovate base abruptly narrowed; branch-leaves denticulate at acumen. Capsule cylindric often nearly straight; teeth yellow; cilia appendiculate. Paraphyllia broad. Stem brown. Dioecious. Differs from *H. cupressiforme* in often circinnate leaves and their brown cells at insertion. — Rocks and logs in woods. *Eur.* r. Sweden less r., Germany, Switzerl.! Engl.: Holt. *Amer.* (»common»: Lesq. et Jam.). Can.: Macoun.

B. Stem us. creeping. Tufts us. green. Capsule thick; lid short-conic not rostellate. Leaves often short-acuminate; alar cells large, basal not brown. Often fruiting. Leaves larger than in the last.

46.**H.fertile** Sendtner.

Stem brown or brown-red; paraphyllia narrow. Leaves recurved below; alar cells somewhat numerous finally hyaline on a short triangular space, inner lower basal gen. pale yellow. All leaves entire or denticulate only above, from ovate base nearly gradually narrowed; those of branches filiform-pointed. Capsule suboblong arcuate not striate; teeth yellow above, brown below; cilia not appendiculate; lid short-pointed. Monoecious. — Earth and logs in woods r. *Eur.* Germany (Wuerttemberg)!; Milde. Switzerl.: Roell. Norway: E. Nyman 1893. *Amer.* Can.: Waghorne. U. S.: Roell.

47.**H.canadense** Kindb. in bull. Torr. club XVII.

Stem gen. green; paraphyllia sometimes broad. Leaves gen. not recurved; alar cells very few (one or two) hyaline impressed below the arrounded basal angles, inner basal (at insertion) finally dark-yellow. Stem-leaves entire or at acumen indistinctly sinuolate, from ovate-oblong base gradually narrowed to a short acumen, sometimes striate. Branch-leaves ovate-lanceolate denticulate nearly all around. Capsule subovate or arcuate finally striate; teeth orange; cilia us. appendiculate; lid muticous. Dioecious. — Logs. *Amer.* not r. Alaska: J. M. Macoun. Can.: J. Macoun; Moser; Waghorne. U. S.: Prof. A. G. Wetherby.

4. Callichroidea.

A. Leaves denticulate. Stem creeping; paraphyllia numerous. Monoecious.

48.**H.circinnale** Hooker.

Leaves marked with orange stripes, red at insertion; lowest basal cells suboval, alar red subquadrate somewhat large on a nearly round space, the others linear. Stem-leaves nearly entire from ovate-oblong base tapering to a shorter acumen; branch-leaves ovate-lanceolate serrulate above, nearly entire near base. Capsule suboval or subobovate; teeth orange; segments pale yellow; lid apiculate; pedicel often longish. Stem red; branches plumiform. Tufts yellowish or green. Habit of *H. molluscum.* — Logs r. *Amer.* Pacif. distr. less r. Can.: Macoun. U. S.: Henderson, com. Cardot. *Eur.* »Irel.»: Cardot in revue bryol.

49.**H.Sequoieti** C. Mueller.

Leaves narrow ovate lanceolate long-acuminate often denticulate below and serrulate above, yellow at insertion; alar cells few round-oval not well-defined, the others linear. Capsule oval-oblong; teeth pale yellow; segments hyaline; lid apiculate; pedicel short. Tufts green. Habit of *H. cupressiforme* (but with small leaves). Differs from *H. circinnale* in brown or green longer us. irregularly pinnate stem, not horizontally patent branches and not striped leaves. — Trees r. *Amer.* Can.: Macoun; Waghorne.

B. Leaves entire or (sometimes in *H. Dieckii*) at acumen slightly denticulate; alar cells hyaline somewhat large. Stem not creeping; paraphyllia none. Dioecious r. fruiting. Capsule large.

50. **H. callichroum** Bridel.

Leaves long-acuminate subdecurrent faintly striate above; alar cells on a short-triangular space, the others linear. Stem-leaves from broad-ovate base abruptly narrowed; branch-leaves gradually tapering. Capsule cylindric arcuate; lid short with very short point; pedicel long. Tufts green or yellowish. Branches often plumiform. Habit of *H. molluscum*. — Humid grassy places princ. in alp region r. *Eur.* Sweden: E. Adlerz. Norway: R. Hartman. Finl.: Brotherus. Engl.: Holt. France: Husnot. Germany: Boulay. Austria: Juratzka. Spetsbergen: Berggren. *Amer.* Greenl.: Berggren.

51. **H. Dieckii** Renauld et Cardot.

Leaves from subovate base acuminate; cells linear-lanceolate exc. the alar. Tufts green. Stem irregularly divided. Habit of *Calliergon montanum*. — *Amer.* r. U. S.: Roell, com. Cardot.

5. **Raphidostegioidea.**

A. Leaves denticulate. Stem radiculose subpinnate; branches compressed.

52. **H. Jamesii** Sullivant. — Rhynchostegium Sull. ic. m.; Hypnum Lesquereux et James.

Leaves entire below, denticulate above, subabruptly tapering to a subulate often filiform-pointed acumen; alar cells few subquadrate not large, the others linear. Stem-leaves with broad-ovate base; branch-leaves ovate-oblong. Perichetial leaves with subulate acumen and sometimes with filiform point, denticulate below it. Capsule suboblong nearly straight; lid rostellate; pedicel short. Tufts green not glossy. Monoecious. Habit of *Raphidostegium recurvans*. — Trees r. *Amer.* Can.: Macoun.

53. **H. pseudo-recurvans** Kindb. — Raphidostegium note on Can. bryol. 1893.

Differs from the last: Leaves denticulate all around, ovate-lanceolate long-acuminate gradually tapering to a filiform point. Perichetial leaves entire below the long linear point. Capsule obovate. Tufts olivaceous sparingly radiculose. Lid of capsule and male flowers not seen. Habit of *H. cupressiforme.* — Wet rocks r. *Amer.* Can. Brit. Col.: Macoun.

B. Leaves entire. Stem eradiculose irregularly divided; branches not compressed. Capsules unknown.

54.**H.pseudo-complexum** Kindb. revue bryol. 1895.

Leaves not appressed when dry; upper cells lanceolate, lower oblong, angular (alar) suboval small not well-defined. Stem-leaves ovate or ovate-oblong. Branch-leaves ovate-lanceolate longer-acuminate often falcate. Tufts dense pale green. Resembles a var. of *H. molluscum* in habit. — Arctic district r. *Amer.* Alaska: J. M. Macoun.

6. Molluscoidea.

A. Leaf-cells more or less sinuous (with crenulate walls). Tufts eradiculose.

a. Leaves small entire not plicate. Stem irregularly divided.

55.**H.condensatum** Schimper; Husnot.

Leaves from ovate base long-subulate, not decurrent; upper cells linear, the angular yellow irregular oblong-rectangular or subquadrate. Capsules unknown. Tufts dense pale green. — Wet places in alp. region r. *Eur.* Germany: Milde.

b. Leaves us. large, denticulate above, plicate. Stem pluniform.

56.**H.crista castrensis** L.

Leaves ovate-lanceolate gradually long-acuminate decurrent; alar cells small few nearly indistinct, the others linear. Capsule large not striate; annulus narrow; lid short-apiculate; pedicel long. Tufts loose bright green, finally whitish. Stem rigid; paraphyllia narrow. — Stones in woods princ. coniferous. *Eur.* common in northern distr., r. in alp. regions. Sweden, Norway! *Amer.* Can.: Macoun. U. S.: Wetherby.

B. Leaf-cells not sinuous. Leaves not or faintly striate. Stem us. pluniform.

a. Stem gen. sparingly radiculose; paraphyllia us. broad. Leaves small.

57.**H.molluscum** Hedwig.

Leaves denticulate below, serrulate above, not or indistinctly decurrent; angular cells small numerous hyaline round-oval, special alar few not well-defined. Stem-leaves from broad-cordate base abruptly acuminate. Capsule suboval; annulus broad;

lid acute or apiculate; pedicel short. Tufts us. green. Stem soft sometimes irregularly divided, not r. eradiculose. — Dry princ. calcareous rocks and earth. *Eur.* nearly common. Sweden (wanting in not calcareous alps), Switzerl., Spain! *Amer.* not common. Can.: Macoun; Waghorne.

58.**H.molluscoides** Kindb. revue bryol. 1895.

Leaves nearly entire, distinctly decurrent; alar cells somewhat large well-defined. Capsule small cylindric arcuate. Otherwise as the last. — On logs r. *Amer.* N. Foundl.: Waghorne.

59.**H.Alaskæ** Kindb. note on Can. bryol. 1893.

Leaves entire subdecurrent gradually acuminate; alar cells large hyaline well-defined. Capsule subovate or arcuate; pedicel short. Tufts green or pale yellow. Stem creeping subpinnate or plumiform. — On trees r. *Amer.* Alaska: J. M. Macoun. Can.: Moser; N. Foundl.: Waghorne.

b. Stem eradiculose without paraphyllia. Leaves gradually acuminate, often large.

60.**H.procerrimum** Molendo.

Leaves large entire or near the cordate base indistinctly sinuolate, not distinctly decurrent; cells as in *H. molluscum* but the alar finally brown. Capsules unknown. Tufts green or brown-green. Stem somewhat rigid. — Rocks in alp. regions r. *Eur.* Norway in Dovrefjeld 1862! Switzerl.! Austria: Breidler. France: Boulay.

61.**H.subplumiferum** Kindb. bull. soc. bot. ital. 1895.

Leaves large, ovate at base, serrulate all around and subdecurrent; alar cells hyaline well-defined somewhat large. Capsules unknown. Tufts brown-green. — Rocks in alp. region r. *Eur.* Switzerl. near Goeschenen: Kindb. and Roell.

62.**H.plumiferum** Mitten. — H. cristula Kindb. bull. Torr. club XVII.

Leaves somewhat large, ovate at base, entire at least below the to an us. long filiform point tapering acumen, sometimes subdecurrent; alar cells few gen. not well-defined. Capsule large narrow subcylindric nearly straight; teeth pale yellow below, hyaline above; lid conic obtuse; pedicel somewhat long. Perichetial leaves faintly striate, abruptly narrowed to the filiform point. Tufts brown-green or green. — Rocks and trees in oak-woods r. *Amer.* princ. in Pacif. distr. Can. Vanc. isl.: Macoun. U. S.: Roell.

* **H.subimponens** Lesq.; Sulliv. icon. musc.

Leaves smaller gen. nearly entire at the subulate acumen.

Capsule more curved; lid acute often apiculate. — *Amer.* r. Can. Brit. Col.: Macoun; N. Brunsw.: Moser. U. S.: Bolænder, herb. Lesquereux, com. C. Mueller and J. Cardot.

7. Hamulosa.

A. Stem-leaves distant. Tufts loose eradiculose.

63.**H.filiforme** Kindb. revue bryol. 1895.

Leaves ovate with short subulate or longer and filiform point, faintly denticulate at acumen; those of stem recurved at one side; upper cells lanceolate, lower oblong, alar few hyaline. Tufts green. Stem long pinnate; branches distant; paraphyllia broad very few. Capsules unknown. Dioecious. — Rocks r. *Amer.* Can. Rocky mts: Macoun.

B. Leaves crowded. Tufts radiculose us. dense.

a. Leaves neither recurved nor decurrent. Monoecious (exc. *H. fastigiatum *dolomiticum*).

64.**H.hamulosum** Br. eur.

Leaves ovate-lanceolate or with broad-ovate base often denticulate at acumen; lowest basal and angular cells short not well-defined, special alar scarcely distinct; other cells linear. Perichetial leaves ovate-oblong. Capsule small nearly straight not constricted. Tufts us. yellowish green. Stem us. not pinnate; paraphyllia broad. — On earth in swamps or on rocks, »in *Amer.* also on trees and logs» (Macoun). *Eur.* in alp. regions gen. r. Norway less r.! Sweden: Lindberg. France: Husnot. *Amer.* r. Alaska: J. M. Macoun. Can.: J. Macoun; Waghorne.

65.**H.fastigiatum** Bridel.

Leaves smaller than in the last, ovate-lanceolate nearly gradually narrowed often denticulate at acumen; lowest basal and angular (alar) cells subquadrate more distinct and more numerous; other cells linear. Perichetial leaves long ovate-lanceolate. Capsule as in the last. Tufts green. Stem us. pinnate with narrow paraphyllia. — Rocks princ. calcareous in or below alp. regions. *Eur.* not r. Sweden, Norway, Switzerl.! Finl.: Brotherus. France: Husnot. Austria: Venturi. *Amer.* r. Can.: Macoun; Waghorne.

***H.dolomiticum** Milde.

Leaves narrower, gradually subulate. Branches less crowded; paraphyllia and rhizoids few. Dioecious. — Dolomitic and schistose rocks r. *Eur.* Switzerl.! Austria: Milde; Venturi.

66.**H.Sauteri** Bryol. eur.; Husnot m. gall.

Differs from *H. fastigiatum*: Leaves smaller and less crowded; perichetial ovate. Capsule smaller more curved faintly constricted. Tufts looser. — Rocks r. *Eur.* Norway, Switzerl.! Italy: Molendo.

b. Leaves recurved to the middle at both sides of basal part or at one side to acumen, subdecurrent. Dioecious.

67.**H.dovrense** Kindb. mém. soc. de Cherbourg 1884.

Leaves crowded entire long-acuminate; those of stem from oval base abruptly narrowed; upper cells sublinear, lower oblong, angular round-oval, special alar hyaline larger. Capsules unknown. Tufts compact sparingly radiculose, blackish brown with green branch-tops or brown-green silver-glossy. Stem not pinnate; paraphyllia broad. — Rocks in higher alp. region r. *Eur.* Norway!; W. Baur.

8. Cupressiformia.

A. Alar leaf-cells very small opake often yellow or brown. Stem us. radiculose often subpinnate. Leaves often recurved below.

68.**H.cupressiforme** L.

Leaves entire or faintly denticulate us. with ovate-oblong base, often large not r. straight; alar cells somewhat numerous on a round-quadrate space, the others us. linear; costa short double or indistinct. Capsule cylindric us. large and curved; cilia somewhat long not appendiculate; lid rostellate or mamillate; pedicel us. not long. Stem brown or green often subpinnate; branches faintly compressed or r. subjulaceous. Very variable. — Earth, trees and dry rocks. *Eur.* common, r. in alp. regions. Sweden etc.! *Amer.* not common. Can.: Macoun; Waghorne.

69.**H.resupinatum** Wilson.

Leaves small often serrulate above, us. nearly straight, narrower and longer-acuminate than in the last; upper cells lanceolate, alar disposed on a short-triangular space. Branch-leaves often with simple to middle reaching costa. Capsule cylindric not large often straight; cilia rudimentary; lid rostrate; pedicel short. Stem irregularly divided; branches slender. Tufts green sparingly radiculose. R. fruiting. — Trees princ. *Castanea.* *Eur.* common in Mediterr. distr. somewhat frequent near Atlantic sea in warmer distr., otherwhere r. Switzerl.! Italy: Arcangeli. France: Le Jolis; Husnot. Engl.: Rogers.

B. Alar or all angular leaf-cells more distinct and pellucid. Stems eradiculose us. loosely cohering and irregularly divided. Leaves gen. entire and not recurved.

a. Special alar leaf-cells few somewhat large. Capsule cylindric.

70.**H.complexum** Miiten.

Leaves from oval-oblong base tapering to a subulate acumen, somewhat large; inner cells narrow, angular round-oval, alar quadrate; »upper cells slightly prominent at the upper and»: Lesq. et Jam.*) — *Amer.* r. Can. N. Brunsw.: Moser.

b. Angular leaf-cells small. Capsules unknown.

71.**H.Vaucheri** Lesquereux.

Leaves small; upper cells lanceolate, lower basal suboblong, angular numerous not hyaline, special alar disposed on a narrow-triangular space. Stem-leaves abruptly narrowed from broad-ovate base; branch-leaves ovate-oblong or ovate-lanceolate. Tufts yellowish green. Branches julaceous or subjulaceous. — Rocks r. *Eur.* princ. in alp. regions. Norway, Switzerl.! Italy: E. Adlerz. France: Boulay. *Amer.* N. Foundl.: Waghorne.

72.**H.subcomplexum** Kindb. revue bryol. 1895.

Differs from the last: Leaves larger and shorter, abruptly narrowed from subovate base; angular cells smaller and finally hyaline without special alar. Tufts green. — *Amer.* r. Can. Cypress hills: Macoun.

9. Amblystegioidea.

73.**H.incurvatum** Schrader. — Amblystegium Kindb. Laubm.; »Amblystegium enerve and Hypnum Blyttii Br. eur.»: Lindb. Leaves narrowly ovate-lanceolate long-subulate or ovate-oblong with filiform point, nearly entire or at acumen denticulate, often loosely disposed sometimes nearly straight; alar cells small green numerous quadrate on a narrow-triangular space. Perichetial leaves denticulate above with filiform point. Capsule small arcuate; lid apiculate-rostellate; cilia nodose; annulus narrow; pedicel short. Tufts bright green silky glossy or brownish, sparingly radiculose. Habit of *Amblystegium subtile.* — On rocks and walls or r. on trees. *Eur.* not r. below alp. regions. Sweden, Switzerl., Italy! *Amer.* r. Can.: Moser; Waghorne.

74.**H.depressulum** C. Mueller. — »H. Vaucheri»: cat. Can. m. in part.

Leaves from oval-oblong base narrowed to a subulate acumen, sinuolate at base faintly denticulate above, crowded subdecurrent; angular cells round-oval not numerous, special alar quadrate hyaline larger. Capsule arcuate somewhat large; lid muticous; pedicel somewhat long. Tufts brown- green. Stem subpinnate. — *Amer.* r. U. S.: Lesquereux, com. Renauld. Can.: Macoun.

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*) The cells are mamillose as in *H. cupressiforme*, *Eurhynchium* etc.

Fam. 14. Fontinalaceæ.

63. Fontinalis L.

A. Leaves serrulate in upper part of acumen.

1. **Serrifoliæ.** Leaves narrow concave not conduplicate, subdistichous, us. distant.

B. Leaves entire or at apex slightly sinuolate.

2. **Angustifoliæ.** Leaves narrow us. concave subdistichous.
3. **Latifoliæ.** Leaves of stem broad us. conduplicate, sometimes soon deciduous, us. tristichous.

1. Serrifoliæ.

A. Leaves narrowly long-acuminate not distinctly decurrent; alar cells not large. Capsule long cylindric; lid long-conic.

1.**F.disticha** Hooker et Wilson; Sulliv. ic. musc. t. 63. — F. microdonta Renauld ?

Leaves ovate-lanceolate not convolute; upper and inner cells narrow sublinear. — *Amer.* r. Can. Macoun Canad. musci n. 231 (»F. Lescurii»).

2.**F.filiformis** Sullivant et Lesquereux. — F. disticha var. tenuior Sulliv. ic. m. tab. 64.

Leaves convolute above, smaller and narrower than in the last; cells suboblong or oblong-lanceolate. — *Amer.* r. U. S.: Langlois, com. Cardot.

B. Leaves broadly acuminate often decurrent; alar cells large. Capsule oval-oblong.

a. Leaves not long-acuminate; apical cells sometimes suboval.

3.**F.Lescurii** Sulliv. ic. m. t. 61. — »F. flaccida Ren. et Card.»: C. M.

Leaves decurrent short-acuminate gen. ovate-oblong; cells gen. linear-lanceolate exc. the alar. Capsule with long-conic lid. — *Amer.* r. U. S.: Brendel, com. C. Mueller; Fitzgerald and Langlois, com. Cardot. Can.: Macoun.

4.**F.Sullivantii** Lindberg. — F. Lescurii ramosior Sull. ic. m. t. 62; F. Langloisii Cardot ?

Leaves not distinctly decurrent, narrowly ovate-lanceolate; cells gen. suboblong or oblong-lanceolate. Capsule with short-conic lid. — *Amer.* r. U. S. Austin, com. Macoun.

b. Leaves long-acuminate; apical cells oblong-lanceolate.

5.**F.denticulata** Kindb. in Hedwigia 1897 p. 61.

Leaves decurrent narrowly ovate-lanceolate, larger and longer than in the both last; cells gen. sublinear or linear-lanceolate. Capsules not seen. — *Amer.* r. U. S. S:t Louis: Engelmann, com. Roell.

2. Angustifoliæ.

A. Leaves long-distant gen. concave. Us. dioecious.

a. Leaves with broad us. obtuse acumen, decurrent.

6.**F.hypnoides** R. Hartman. — F. Ravani Hy.

Leaves ovate-lanceolate; alar cells well-defined, the others lanceolate. Capsule short, oval or subcylindric; teeth red; lid short-conic. Stem flaccid. Habit of *Hypnum riparium*. — Logs and stones in stagnant or not rapidly running water r. *Eur.* Sweden!; R. Hartman; Lindberg. France: Hy, com. Le Jolis. *Amer.* Can : Macoun. U. S.: Roell, com. Cardot.

* **F.longifolia** C. Jensen; Cardot monogr. Fontinal.

»Leaves sharply acuminate split when old; middle cells sublinear. Capsules unknown. — *Eur.* r. Iceland: Feddersen»: Limpricht.

7.**F.Novæ Angliæ** Sullivant ic. m. — »F. tenella Ren. et Card.»: C. M.; F. Cardoti Renauld ?

Differs from *F. hypnoides*: Leaves smaller, slightly sinuolate at apex; apical cells suboval, alar suboblong not well-defined but impressed at angles. Capsule oval-oblong; lid long-conic. — Rivers r. *Amer.* Can. Brit. Col.: Macoun.

* **F.involuta** Renauld et Cardot.

Leaves gen. involute at borders; cells sublinear exc. the more or less distinct alar. Branches more compressed. — *Amer.* r. U. S.: Langlois, com. Cardot.

b. Leaves narrowly long-acuminate acute often subulate, us. not distinctly decurrent.

8.**F.dichelymoides** Lindberg.

Leaves narrowly ovate-lanceolate; alar cells somewhat well-defined not distinctly impressed at angles, the others narrow sublinear. Capsules unknown. Habit of *Hypnum fluitans* and *Dichelyma capillaceum*. — Lakes r. *Eur.* Finl.: Brotherus. *Amer.* »U. S.»: Cardot.

* **F.microphylla** Schimper; Limpricht.

»Leaves decurrent. Capsules unknown. — Lakes r. *Eur.* Germany»: Limpricht.

B. Leaves gen. crowded. Dioecious or (*F. baltica*) paroecious.

a. Leaves short, channelled in middle.

9.**F.maritima** C. Mueller.

Leaves broadly ovate-lanceolate obtuse or short-acuminate subacute; alar cells somewhat well-defined, the others narrow sublinear. Branches rigid. Capsules unknown. — *Amer.* r. U. S. Washington in Neah-bay of Pacific sea: Eggers, com. C. M.

b. Leaves long concave; alar cells well-defined.

aa. Leaves somewhat broadly ovate-lanceolate; apical cells few suboval.

10.**F.squamosa** L.

Leaves not distinctly decurrent, subacute often with short point, more or less acuminate; middle cells lanceolate-linear, inner basal sublanceolate, alar impressed at angles. Capsule oval-oblong; teeth red; segments united; lid short-conic. Rocks in running water. — *Eur.* Germany: Schimper. Belgium: Gravet. France: Pelvet. Austria: Schmidt. Norway: Nyman.

* **F.Delamarei** Renauld et Cardot.

Capsule smaller oblong-cylindric; »teeth much shorter»: Cardot. — *Amer.* r. U. S. Miquelon: Delamare, com. Cardot.

bb. Leaves narrowly ovate-lanceolate: alar cells not impressed, the others uniform narrow.

11.**F.dalecarlica** Schimper.

Leaves decurrent gen. short-acuminate subacute; cells sublanceolate. Capsule oval-oblong; teeth orange-red; segments us. not wholly united; lid short subconvex obtuse. — Running water or lakes in northern districts. *Eur.* Sweden not r.!; O. Swartz; R. Hartman. *Amer.* Can.: Macoun; Fowler.

12 **F.baltica** Klinggræff.

»Differs from the last: Leaves subulate long-acuminate. Peristomial teeth red; lid conic acute. Paroecious. — Lakes r. *Eur.* Germany»: Limpricht.

13.**F.seriata** Lindberg.

Leaves us. not distinctly decurrent, long-acuminate often subulate with a short half-twisted point; cells sublinear. Capsules unknown. — Rivers r. *Eur.* Sweden: Conr. Indebetou, detector of this species.

3. Latifoliæ.

A. Leaves of stem distant very concave inflated decurrent, sometimes conduplicate; cell-walls sinuous.

14.**F.Heldreichii** C. Mueller.

Stem us. simple; its leaves cymbiform subcircular obtuse obtusate or short-acuminate; alar cells not well-defined, the others sublanceolate. Capsules unknown. — Rivulets in alp. region r. *Eur.* Greece: Heldreich.

B. Leaves of stem distant, plicate in middle, decurrent us. conduplicate; cells subfusiform not sinuous at walls. Us. dioecious.

a. Endostome completely cancellate. Stem without special branchlets.

15.**F.antipyretica** L. — F. Howellii Ren. et Card. ?

Leaves of stem ovate-oblong with gen. obtuse not long acumen; alar cells brown gen. not well-defined, the others us. sublinear-fusiform. Branch-leaves us. not much narrower. Perichetial leaves us. obtuse. Capsule oval or oval-oblong r. round-oval; teeth red; lid obtuse subconvex or short-conic. Very variable. — A var. with broader leaves and wider cells often is mistaken for *F. gigantea* Sulliv.; its leaves are often copper reddish. — Common in running water, r. in marshes and in alp. regions. *Eur.* Sweden! *Amer.* Can.: Macoun. U. S: Delamare, com. Cardot.

* **F.gracilis** Lindberg.

Leaves more heteromorphous; the vernal of stem soon deciduous, those of branches us. as narrow as in *F. dalecarlica.* Capsule often round-oval. *Eur.* probably not r. Sweden! Finl.: Lackstrœm, com. Brotherus. Austria: Venturi.

* **F.arvernica** Renauld.

»Leaves oblong-lanceolate, sometimes with 2—5 teeth at apex. — Lakes r. *Eur.* France: Renauld»: Cardot l. c.

* **F.californica** Sullivant.

Leaves often less distinctly conduplicate, gen. broad and nearly uniform; alar cells more distinct subhyaline. — Stagnant water r. *Amer.* U. S.: Bolænder, com. C. Mueller and J. Cardot.

* **F.Duriæi** Schimper.

Leaves as in last subspecies but slightly denticulate at apex; apical cells suboval, middle sublanceolate. *Eur.* r. France: Espagne, com. Husnot. (*Africa*: Durieu, com. Husnot.) *Amer.* »U. S.»: Cardot.

* **F.islandica** Cardot.

»Leaves narrower, sharply long-acuminate; areolation irregular. *Eur.* Iceland»; Cardot.

* **F.sparsifolia** Limpricht.

»Leaves lanceolate-linear. Peristomial teeth yellowish red. Habit of *F. antip. *gracilis* but more slender. — *Eur.* Norway: Bryhn»: Limpricht.

* **F.androgyna** Ruthe.

»Leaves slightly decurrent; alar cells well-defined. Paroecious. — *Eur.* Germany: Ruthe»: Limpricht.

16.**F.neomexicana** Sullivant et Lesquereux; Sull. ic. m. — »F. antipyretica var.»: Cardot.

Differs from *F. antipyretica*: Leaves less distant and longer-decurrent, bright green or yellowish glossy; alar cells well-defined.

Perichetial leaves abruptly narrowed to a longish subulate acumen. — Streams r. *Amer.* Can.: Macoun. U. S.; Henderson, com. Cardot.

17.**F.gothica** Cardot et Arnell.

Leaves of stem ovate obtuse sometimes canaliculate or less conduplicate; apical cells few suboval, alar faintly brown well-defined impressed at angles. Branch-leaves narrow. Capsules unknown. — Stagnant water r. *Eur.* Sweden: O. Nordstedt.

b. Endostome cancellate only near apex. Stem with special short branchlets; their leaves small sublinear subobtuse convolute in upper half.

18.**F.biformis** Sullivant icon. muscor.

Vernal stem-leaves distant obtuse entire ovate or oblong, concave or conduplicate, soon deciduous; alar cells not well-defined, the others narrow sublinear. Estival stem-leaves crowded narrowly ovate-lanceolate subacute long-decurrent, slightly denticulate at apex and gen. short-acuminate; apical cells suboval, the others lanceolate or oblong-lanceolate exc. the alar. Capsule oblong-cylindric; lid long-conic. — Streams r. *Amer.* Can.: Macoun. U. S.: Sullivant, com. C. Mueller and J. Cardot.

C. Leaves of stem nearly crowded and not often distinctly decurrent, sometimes subconcave not conduplicate.

a. Leaves of stem very obtuse obtusate not distinctly decurrent. Stem without special branchlets.

19.**F.gigantea** Sulliv. icon. m.; Kindb. rev. bryol. 1895.

Stem-leaves round-ovate very large and broad, not often conduplicate; apical cells suboval, middle suboblong. Branch-leaves ovate-oblong short-acuminate or obtusate. Capsule broad-oval; lid obtuse. Confounded with large states of *F. antipyretica.* — Running water r. *Amer.* Can.: Macoun Canad. musci n. 228.

* **F.mollis** C. Mueller in Bot. Centralblatt.

Stem-leaves broad-ovate very crowded not decurrent, plicate in middle but not conduplicate; upper cells suboval, middle lanceolate. Capsules unknown. — Rivers r. *Amer.* U. S. Pacif. distr.: Roell, com. C. Mueller.

b. Leaves of stem and larger branches long-acuminate subulate, often decurrent. Stem with small branchlets (as in *F. biformis*); their leaves oval-oblong very small.

20.**F.Kindbergii** Renauld et Cardot; Limpricht. — F. chrysophylla Cardot ?

Leaves often copper-brown and glossy; cells narrow. Stem-leaves ovate-lanceolate sometimes conduplicate; branch-leaves concave not plicate. Capsule oblong-cylindric; lid conic; teeth red. — Ponds r. *Amer.* Can. Vanc. isl.: Macoun Canad. musci n. 233. »U. S.» Cardot. *Eur.* »France, Italy, Austria»: Cardot.

64. **Dichelyma** Myrin.

A. Leaves us. nearly straight, upper obtuse or subobtuse; costa not excurrent. Endostome not or only at apex cancellate.

1.**D.pallescens** Br. eur. — Neckera leucoclada C. M. syn.

Upper leaves denticulate below, serrate above. Capsule oval-oblong; pedicel short-exserted. Tufts olive-green. — On wet logs or on base of trees r. *Amer.* Can.: Macoun; Moser; Fowler.

B. Leaves subulate falcate; costa excurrent or r. (in *D. cylindricarpum*) percurrent.

a. Pedicel of capsule not exserted above perichetial leaves. Endostome not or only at apex cancellate.

2.**D.capillaceum** Dickson. — Fontinalis Dicks.; Dichelyma Schimp.

Upper leaves entire; costa long-excurrent. Capsule oval-oblong, Tufts green or blackish. Leaves smaller than in *D. falcatum.* — Trees and logs by ponds or in rivulets r. *Eur.* Sweden: C. Hartman; Lindberg; Berggren. *Amer.* Can.: Macoun; Moser; Drummond n. 234.

b. Pedicel long-exserted. Endostome completely cancellate.

3.**D.falcatum** Hedwig. — Fontinalis H.; Dichelyma Myrin.

Leaves somewhat large, upper entire below and serrate above; costa short-excurrent. Capsule oblong-cylindric. Habit of *Hypnum fluitans.* — Swamps, lakes and brooks in northern districts. *Eur.* Sweden and Norway not r.! Germany very r.: Schiffner. *Amer.* r. Can.: Labrador: Waghorne.

4.**D.uncinatum** Mitten.

Leaves smaller than in the last; upper denticulate below, serrate above; costa long-excurrent. Capsule oval; pedicel shorter than in the last. Habit of *D. capillaceum.* — Logs and trees in ponds and brooks r. *Amer.* Can.: Macoun. U. S.: Howell and Henderson, com. Cardot.

5.**D.cylindricarpum** Austin.

Leaves small as in the last; upper entire at least below, sometimes faintly denticulate (not serrate) above; costa long-excurrent or percurrent. Capsule cylindric; pedicel long-exserted. Habit of the last. — Inundated rocks r. *Amer.* Can. Cascade mountains: Macoun; determ. Austin.

65. **Brachelyma** Schimper.

1.**B.subulatum** Beauvois. — Fontinalis Beauv.; Brachelyma Schimp.; Neckera C. M. syn.

»Leaves distant tristichous carinate decurrent oblong-lanceolate acute or obtuse, denticulate above; lower not falcate; cells pellucid, middle short, basal and marginal long, alar much larger; costa subpercurrent. Capsule oval; teeth orange; segments rufescent not or only at apex cancellate. Stem long pinnate; branches curved above»: C. M. and Cardot. — Logs and trees in rivulets r. *Amer.* »U. S.»: C. M. syn.

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European and N. American Bryineæ (Mosses)

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Acrocarpous.

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1897.

Fam. 15. Schistostegaceæ.

66. Schistostega Mohr.

1.**S.osmundacea** Dickson. — Mnium Dicks., Schistostega Mohr.

Lobes of the frons (»leaves») suboblong short-acuminate acute entire; cells large. Capsule minute globose; pedicel elongate. Stem naked below, often with long basal shoots bearing a bud of ovate-lanceolate leaves. Prothallium (protonema) effulgent as a smaragd. — Dark caverns of sandstone rocks or (in Can.) on roots of stumps. *Eur.* not r. Sweden! *Amer.* Can.: Macoun.

Fam. 16. Eustichiaceæ.

67. Eustichia Bridel.

1.**E.imbricata** Desvaux. — Fissidens Desv.; Eustichia Kindb.; E. norvegica Brid. (incorrect name).

Leaves entire: lower short truncate or apiculate, upper acuminate; costa not excurrent. Perichetial leaves very much longer, long-subulate distantly crenulate, often hyaline at apex. Capsule globose chestnut-colored scarcely emergent above the points of perichetial leaves; pedicel shortish arcuate when moistened. Dioecious very r. fruit. — Shaded sandstone rocks r. *Amer.* U. S.: Sullivant; Cheney, fruit.; Roell; Mrs Britton. *Eur.* »Iceland: Vahl»: Schimper.

Fam. 17. Polytrichaceæ.

68. Catharinea Ehrhart.

1. **Lepidophyllæ.** Leaves undulate, furnished with transverse rows of scales at back. Mostly paroecious.

2. **Leiophyllæ.** Leaves not distinctly undulate, without scales. Dioecious.

1. Lepidophyllæ.

A. Leaves broader at base. Capsule strangulate; calyptra smooth.

1.**C.Selwyni** Austin. — Atrichum Aust.; Catharinea Kindb. revue bryol. 1894.

Leaves broad oblong-lanceolate obtusate subobtuse, dentate to below middle, very chlorophyllose above, pellucid and sometimes rufescent below, spreading when moistened; lamellæ us. 6; costa dentate at back. Capsule nearly straight. Paroecious. — On earth or stumps r. *Amer.* Can.: Macoun. U. S.: Howell, com. Cardot; Leiberg, com. Mrs Britton.

B. Leaves narrowed at base. Capsule not or slightly strangulate; calyptra scabrous at apex.

a. Leaves limbate by 2 rows of linear cells; costa dentate above at back. Capsule cylindric.

2.C.undulata L. — Bryum L.; Catharinea Weber et Mohr; Atrichum Br. eur.

Leaves narrowly lanceolate acuminate acute, dentate also below middle, very chlorophyllose, spreading when moistened, gen. large and green; lamellæ us. 2—4. Capsule us. large curved; pedicel often very long. Paroecious or polygamous; male plants rare. — Earth and wet rocks princ. in lower regions, common. *Eur.* Sweden, Norway, Switzerl.! *Amer.* Can.: Macoun. U. S.: Roell; Sullivant, com. C. Mueller.

3.C.Hausskneehtii Juratzka et Milde. — Atrichum J. et M.; Catharinea Brotherus; C. anomala Bryhn.

Differs from the last: Leaves lanceolate short-acuminate subobtuse, less large. Capsules smaller and nearly straight, sometimes clustered. More often paroecious. — Wet earth in woods r. *Eur.* Norway: Bryhn. *Amer.* N. Foundl.: Waghorne.

4.C.angustata Bridel. — Atrichum Br. eur.

Leaves lanceolate or oblong-lanceolate short-acuminate subobtuse, entire below middle, faintly chlorophyllose and often subpellucid, patent when moistened, less large and less undulate than in the both last and gen. olive-green; lamellæ us. 5—7. Capsule less large and nearly straight; pedicel red shortish. Dioecious. Male plants abundant in separate tufts with cup-shaped flowers; perigonial leaves with thick costa. — Sandy and clayey earth, often on rocks and stone-walls. *Eur.* princ. in southern distr. Switzerl.! *Amer.* more common. Can.: Macoun. U. S.: Wetherby.

* **C.xanthopelma** C. Mueller. — Atrichum Lesq. et Jam.

Leaves more distinctly obtuse with smaller teeth. Pedicel of capsule long and pale. — *Amer.* r. U. S.: Boll, com. C. Mueller; Langlois, com. Renauld.

b. Leaves indistinctly limbate by one row of linear cells; costa nearly smooth. Fruiting stem unknown.

5.C.rosulata C. M. et Kindb.; Atrichum cat. Canad. m.

Shoot-leaves short rosulate: upper oblong-lanceolate subobtuse dentate above middle and scarcely undulate, spreading when moist, often without scales at back. — On old stumps r. *Amer.* Can. Brit. Col.: Macoun.

2. Leiophyllæ.

6.C.crispa James. — Atrichum Sulliv. icon. musc.

Leaves large distant obtusate obtuse oval-oblong or oblong-lanceolate, denticulate above middle, narrowed at base; lamellæ us. 3; costa smooth at back. Capsule subcylindric or subclavate; pedicel not long. Stem often high. R. fruiting. — Clay soil or among grass near water. *Eur.* r. Engl.: Rogers. *Amer.* less r. Can.: Macoun (fruit.).

7.**C.tenella** Roehling. — Atrichum Br. eur.

Leaves somewhat small crowded acute not broad, suboblong or oblong-lanceolate not much narrowed below, denticulate also below middle; lamellæ 3—5; costa dentate above at back. Capsule small oblong; pedicel not long. Stem about 1 c. m. or lower. — Wet sandy soil in lower regions. *Eur.* princ. in northern distr. Sweden not r.!

69. **Oligotrichum** Lamarck et De Candolle.

A. Leaves narrow subvaginant us. brown, faintly crisped when dry.

a. Leaves with short lamellæ at back.

1.**O.hercynicum** Ehrh. — Catharinea Ehrh.; Oligotrichum Lam. et D. C.

Leaves dentate above at borders and at back, gradually narrowed, subulate or acute; lamellæ of upper side 8—12 cohering, those of under side 3—5 near base. Capsule suboblong not or slightly strangulate; pedicel not long; calyptra often with many hairs. — Sandy ground princ. in alps. *Eur.* less r. in northern distr. Norway! *Amer.* r. Alaska: J. M. Macoun.

2.**O.integrifolium** Kindb. revue bryol. 1894.

Differs from the last: Leaves broader, subobtuse entire, smooth at back. Capsule thicker below, strangulate plicate when dry. — Alp. region r. *Amer.* Can. Brit. Col.: Macoun.

b. Leaves with long lamellæ at back.

3.**O.aligerum** Mitten; Sullivant icon. m.

Leaves longer than in the both last, sublinear subulate or acute, dentate at least above middle of borders; lamellæ of upper side 5—8 near costa, those of under side 3—5 near costa and 4—5 near borders. Capsule strangulate narrowly ovate-oblong or subcylindric; lid rostrate; pedicel thin very long; calyptra with few hairs in upper part. — Clay banks in alp. regions r. *Amer.* Can. Brit. Col.: Macoun.

B. Leaves broad large not sheathing, green, cirrate-crisped when dry; lamellæ long also at back, 3—6 near costa on upper side, 2—3 near costa and sometimes 1—2 rudimentary near borders at back.

4.**O.parallelum** Mitten. — Atrichum Mitt.; Sull. ic. m.; Oligotrichum Kindb. l. c.

Leaves sublanceolate (or in male plant oval-oblong) acute or short-acuminate, dentate to below middle, marked with longitudinal stripes at back; costa scarcely percurrent also in the nearly similar perichetial leaves. Capsule as in the last but thicker; lid rostrate; pedicel thick longish; calyptra unknown. — Wet rocks in alps r. *Amer.* Brit. Col. in higher alp. region: Macoun. *Eur.* Norway: E. Nyman.

5.**O.leiophyllum** Kindb. — Atrichum in bull. Torr. club.

Differs from the last: Leaves not striped, upper longer-acuminate; perichetial with still longer acumen and excurrent costa. Capsule longer. Calyptra nearly glabrous. — Damp earth in alp. regions. *Amer.* Alaska: J. M. Macoun. Can. Brit. Col. and Vanc. isl.: J. Macoun.

70. **Psilopilum** Bridel.

1.**P.lævigatum** Wahlenberg. — Polytrichum Wahl. fl. lapp.; Psilopilum Limpricht.

Leaves short ovate-oblong subobtuse crenulate above, not dentate at back. Capsule large broadly subovate more or less curved; pedicel not long. — Sandy or turfy soil in arctic distr. *Eur.* Spetsbergen: A. E. Nordenskiœld; Berggren. *Amer.* Can.: Breutel. Alaska: Palmer and J. M. Macoun. Greenl.: Berggren.

71. **Bartramiopsis** Kindb. revue bryol. 1894.

1.**B.Lescurii** James. — Atrichum Jam.; Bartramiopsis Kindb.; Oligotrichum Mitten.

Leaves linear-lanceolate short-acuminate, sharply dentate to the sheath, not much loosely disposed, more or less incurved when dry, nearly straight and spreading when moist; lamellæ 4—8. Stem 2—3 centim. long nearly eradiculose, naked and filiform below. (Described to specimens from Japan). »Capsule erect short cylindric-ovate constricted below mouth; pedicel short»: Lesq. et Jam. — *Amer.* »Alaska»: Lesq. et Jam. (Japan: Bisset, determ. Mitten).

* **B.sitkana** Kindb. l. c.

Leaves longer, long-subulate more loosely disposed, cirrate when dry. Capsules unknown. Habit of *Bartramia crispa*. — *Amer.* Alaska, Sitka: J. M. Macoun.

72. **Catharinella** Kindb. rev. bryol. 1894.

A. Leaves short-acuminate sheathing; marginal teeth large with a single red cell at apex; lamellæ 20—30. Stem and pedicel not long.

1.**C.contorta** Menzies. — Catharinea Mz.; Pogonatum Sull. ic. m. in part.

Leaves dark green sublinear acute strongly dentate nearly all around; cells of sheath chlorophyllose subquadrate; lamellæ about 30, their cells rotundate green; costa dentate at back, not excurrent. Capsule narrow subcylindric strangulate not large; peristomial membrane elevate; pedicel contorted. — On roots of trees (Douglas-firs) r. *Amer.* Pacif. distr. Alaska: J. M. Macoun. Can. Brit. Col.: J. Macoun. U. S.: Hall, com. Macoun.

2.**C.atrovirens** Mitten. — Pogonatum Mitt.

Differs from the last: Leaves shorter, more distinctly sheathing, bright or glaucous green, more strongly crisped; cells of sheath hyaline; lamellæ about 20. — Roadsides r. *Amer.* Can. Brit. Col.: Macoun.

B. Leaves long-acuminate not sheathing; marginal teeth large with 2—3 red cells; lamellæ about 40. Stem and pedicel very long.

3.**C.erythrodontia** Kindb. l. c. — Pogonatum contortum Sull. l. c. in part.

Habit of *C. contorta.* — Wet woods r. *Amer.* Alaska: J. M. Macoun. Can. Brit. Col. and Vanc. isl.: J. Macoun.

C. Leaves short-acuminate short-sheathing; marginal teeth not large, formed by one single cell, finally pale yellow not red; lamellæ about 20. Capsules unknown. Stem not long.

4.**C.Dixoni** Braithwaite. — Catharinea Braithw. brit. mossfl.; Catharinella Kindb. rev. bryol. 1894.

Leaves dark green not long, linear-lanceolate acute, dentate above gen. to middle, broadly bordered by wings of lamina often nearly all around; cells of sheath subquadrate not chlorophyllose; costa short-excurrent dentate at back. — On base of trees r. *Eur.* Engl.: Dixon, com. Braithwaite.

73. **Polytrichum** L.

A. Calyptra short-acuminate densely hairy.

a. Capsule papillose. Leaves often incurved when dry, r. aristate.

I. **Aloidella.** Capsule without angles and apophysis.

b. Capsule smooth. Leaves rigid not incurved, gen. aristate.

II. **Pogonatum.** Capsule without angles and apophysis, green when unripe, finally blackish or r. brown. Stem us. branched. Apical cell of lamellæ thick-walled subglobose papillose.

III. **Eu-Polytrichum.** Capsule (ripe) with 4—6 angles and us. distinct apophysis, soon becoming brown. Stem us. simple. Apical cell of lamellæ smooth or unipapillate.

B. Calyptra long-acuminate sparingly hairy.

IV. **Polytrichadelphus.** Capsule smooth with 2 angles; apophysis none. Leaves rigid not incurved. Stem branched.

I. **Aloidella** C. Mueller syn.

A. Leaves incurved when dry; cells of lamellæ smooth thin-walled; costa not excurrent. Stem us. short simple. Protonema often persistent.

a. Upper leaves long narrow subulate, broadly sheathing; wings of lamina very broad; lamellæ about 10.

1.**P.pennsylvanicum** Hedwig; C. M. syn. — Pogonatum brevicaule Beauvois; Sulliv. icon. musc.

Lower leaves short short-acuminate, upper distantly dentate or crenulate. Capsule subcylindric. Stem very short. — Clayey soil by roadsides. *Amer.* eastern slope. Can.: Macoun; Fowler; N. Foundl.: Waghorne. U. S.: Sullivant, com. C. Mueller; Austin; Olney; Cummings.

b. Leaves broad obtusate not long; lamellæ numerous.

2.**P.nanum** Schreber. — P. subrotundum Hudson; Braithwaite.

Leaves subobtuse faintly crenulate above; wings of lamina somewhat broader below. Capsule finally short-piriform. Stem simple not high. — Sandy or clayey soil. *Eur.* not r. in lower regions. Sweden!

3.**P.brachyphyllum** Richard. — Pogonatum Sulliv. icon. m.

Differs from the last: Leaves obtuse entire; capsule suboval; stem shorter. — Roadsides. *Amer.* U. S.: Austin; Langlois, com. Cardot.

4.**P.aloides** Hedwig. — Pogonatum Beauvois.

Leaves sharply dentate us. somewhat short, less broad than in the both last and gen. longer acuminate; wings of lamina narrow. Capsule oblong-piriform or subcylindric. Stem often somewhat high r. branched. — Sandy soil. *Eur.* not r. Sweden, Germany, Switzerl.!

B. Leaves not incurved but gen. appressed when dry, us. sharply dentate with narrow wings; lamellæ numerous, their apical cell thick-walled papillose or crenulate. Stem r. simple.

a. Leaves sharply dentate. Stem us. branched.

5.**P.urnigerum** L. — Pogonatum Beauvois.

Leaves acute more or less acuminate, gen. not aristate, often somewhat long; apical cell of lamellæ globose. Perichetial leaves aristate. Capsule subcylindric us. large and not wide-mouthed; pedicel thin often very long. — Earth and rocks also in higher alp. regions. *Eur.* common. Sweden, Norway, Switzerl.! *Amer.* Can.: Macoun; Waghorne. Alaska: J. M. Macoun.

6.**P.dentatum** Menzies; C. M. syn. — Pogonatum Sull. ic. m.

Leaves as in the last but more sharply dentate, the upper with short reddish or whitish awn by the excurrent costa; apical cell of lamellæ truncate crenulate. Capsule small narrow often wide-mouthed; pedicel not long. Stem not high, sometimes simple. Resembles a small alpine variety of the last. — In alps and arctic distr. r. *Amer.* Alaska: J. M. Macoun. Can. Brit. Col. and Labrador: Macoun. U. S.: Austin; Oakes.

b. Leaves faintly denticulate. Stem often simple.

7.**P.capillare** Richard. — Pogonatum Sulliv. ic. m.

Leaves short obtusate subobtuse distantly denticulate; wings of lamina not prominent; apical cell of lamellæ truncate crenulate; costa not excurrent. Capsule oblong-cylindric faintly papillose, not wide-mouthed. Habit of the last. — Alps and arctic distr. r. *Eur.* Russia: Brotherus. *Amer.* U. S.: Rudkin, com. Mrs Britton.

8.**P.Wahlenbergii** Kindb. rev. bryol. 1894. — »P. capillare var. minus Wahlenberg fl. lapp.»: Lindb. et Arnell.

Differs from the last in leaves subacute nearly entire; wings of lamina prominent, very much broader below. Capsule oval or cylindric. — Northern alp. distr. r. *Eur.* »Sweden»: Wahlenb. (Asia, Sibiria: H. W. Arnell).

II. Pogonatum Bridel, in part.

A. Leaves falcate when moist, patent or spreading when dry; lamellæ about 60. Outer perichetial leaves very much longer. Pedicel of capsule finally brown.

9.**P.Macounii** Kindb. bull. Torr. club 1889.

Leaves very long, bordered by the wings of the strongly dentate lamina, long-subulate; awn long rough reddish. Perichetial leaves rough near apex, the inner shorter more acute. Capsule oblong-cylindric strangulate, larger than in *P. alpinum*; lid large conic-subulate, half as long as capsule. Higher and more robust than allied species. — Rocks and earth princ. in alp. region r. *Amer.* Pacif. distr. Can. to 1350 metr. a. s.: J. Macoun. Alaska: J. M. Macoun.

B. Leaves straight or faintly curved when moist, more or less appressed when dry; lamellæ about 30. Perichetial leaves not longer. Pedicel yellowish.

a. Leaves distinctly bordered by the wings of lamina, acuminate, gen. long and not strongly appressed when dry.

10.**P.alpinum** L. — Pogonatum Roehling.

Leaves dentate nearly to the sheath, very patent when moistened; awn short rough reddish also in perichetial leaves, which in upper part are furnished with few lamellæ. Capsule us. oblong (r. subcylindric) and not or slightly oblique; lid gen. long-rostrate. Stem us. branched above. — Stony and grassy places on mountains princ. in alps. *Eur.* common in alps. Norway, Switzerl.! *Amer.* Greenl.: Berggren. Alaska: J. M. Macoun; Palmer. Can.: J. Macoun. U. S.: Roell. — A var. with subcylindric capsule is found in Can. Northern Labrador by J. Macoun 1896.

* **P.brevifolium** R. Brown.

Leaves very short, appressed when dry. Capsule globose. — In higher alp. region r. *Eur.* Norway! Sweden: E. Nyman. *Amer.* »Greenl.: Vahl»: Lange.

11.**P.microdontium** Kindb. in Biblioth. botan. 42 (1897). — Pogonatum alpinum var. microdontium Kindb. cat. Canad. m.

Leaves entire or minutely denticulate only in upper third or half of lamina, longer-subulate than in *P. alpinum*; uppermost leaves very long, suddenly larger and spreading; awn reddish somewhat long, faintly rough. Perichetial leaves with very long nearly smooth awn; lamellæ somewhat numerous. Capsule large thick globose or broad-oval, often oblique; lid short-apiculate. Stem gen. simple. — Alpine princ. arctic districts r. *Amer.* Greenl.: Vanhoeffen. Alaska: J. M. Macoun; Palmer. Can. Brit. Col.: J. M. Macoun.

12.**P.Vanhoeffeni** Kindb. in Biblioth. botan. 42 (1897).

Leaves entire or only near apex (scarcely in upper third of lamina) dentate, not long but long-acuminate, very narrowly bordered by lamina, nearly appressed when dry, not much open when moist; awn short rough red-yellow. Perichetial leaves much narrower with not few lamellæ. Capsule obovate oblique; lid scarcely shorter than half capsule. Stem us. sparingly divided above, often to 8 c. m. high; pedicel scarcely 3 c. m. Tufts brownish. — *Amer.* r. Greenl.: E. Vanhoeffen.

b. Leaves bordered by wings of lamina only near apex, short acute but gen. obtusate, appressed when dry.

13.**P.septemtrionale** Swartz; Wahlenberg fl. lappon., not C. M. syn.; Kindb. revue bryol. 1894.

Leaves entire or with very few teeth near apex; awn very short or indistinct. Perichetial leaves short-apiculate nearly without lamellæ. Capsule globose or broad-oval; lid short-apiculate. Stem low simple or very slightly branched. Habit of *P. sexangulare.* — Higher alp region r. *Eur.* Norway! *Amer.* Can: J. Macoun. Alaska: J. M. Macoun. Greenl.: Vanhoeffen.

14.**P.polare** C. Mueller.

Differs from the last in more distinct and dentate awn of leaves; capsule oval often oblique; stem divided somewhat high. — Arctic distr. r. *Amer.* Greenl.: Pansch, com. C. Mueller.

III. Eu-Polytrichum.

A. Capsule green and not distinctly angled when unripe, us. 6-angled when ripe. Leaves channelled or with inflexed wings, not appressed when dry; awn red-brown or indistinct; apical cell of lamina not papillate. Stem simple.

15.**P.sexangulare** Floerke. — P. septemtrionale C. M. syn.

Leaves short obtusate obtuse entire or at apex with very few teeth, not rough at back; wings very narrow or indistinct; lamellæ about 30; awn indistinct or very short and red. Capsule suboval finally short-prismatic; pedicel yellowish or pale red not long. Stem not tomentose us. low. Habit of *P. alpinum.* — On earth in higher alp. region. *Eur.* less r. Norway! Sweden: Indebétou. *Amer.* r. Can. Brit. Col.: Macoun. U. S.: Roell.

16.**P.gracile** Dickson; Menzies.

Leaves long subulate-acuminate dentate to the sheath, us. green; wings broad princ. below; lamellæ about 40; awn brownish not long. Perichetial leaves hyaline-bordered. Capsule round-oval finally cubic; apophysis sometimes less distinct; lid broad-conic when young, finally apiculate or rostellate; pedicel long yellowish or finally reddish. Spores about 0,02 m. m. Stem us. tomentose below, often high. — Turfy soil and rocks also in alps. *Eur.* not r. Sweden, Norway! *Amer.* not common. Can.: Macoun.

B. Capsule 4-angled prismatic soon becoming brown. Leaves acuminate acute with distinct wings.

a. Leaves entire or above with few teeth, channelled or convolute; apical cell of lamellæ unipapillate. Perichetial leaves hyaline above.

17.**P.juniperinum** Willdenow.

Leaves long long-subulate gen. entire, very patent or curved when moist, us. not appressed when dry; lamellæ about 50; costa rough above at back; awn long rough wholly red.

Perichetial leaves entire somewhat long-acuminate, lamellate above; awn rough and red. Capsule rectangular-prismatic; pedicel often very long. Stem not much naked and gen. not tomentose, sometimes branched. — Heaths and woods common but less often in alps. *Eur.* Sweden, Norway, Switzerl! *Amer.* Can.: J. Macoun. Alaska: J. M. Macoun.

18.**P.strictum** Banks.

Differs from the last: Leaves shorter with shorter acumen, us. appressed when dry; lamellæ about 30. Capsule cubic; pedicel less long. Stem tomentose us. simple. — Swamps princ. in alps not common. *Eur.* Norway! *Amer.* Can.: Macoun; Waghorne. Greenl.: Vanhoeffen.

19.**P.hyperboreum** R. Brown.

Leaves short short-acuminate entire, straight and not much patent when moist, appressed when dry; lamellæ about 30; costa smooth; awn short faintly rough, often (at least in upper leaves) partly whitish, in some leaves wholly red. Perichetial leaves entire somewhat long-acuminate; awn whitish above, nearly smooth. Stem of female plants branched often tomentose. Capsule cubic; pedicel not long. Male plant with shorter broader leaves, disposed in distant fascicles. Habit of the last. — Dry and wet places in northern alps. *Eur.* Norway! Finl.: Brotherus. *Amer.* Greenl.: Berggren; Vanhoeffen. Can. N. Labrador: Macoun 1896.

20.**P.boreale** Kindb. Laubm. Schwed. u. Norw.

Differs from the last: Leaves gen. dentate near apex below the awn, with longer acumen; costa rough at back; awn longer always whitish above. Perichetial leaves more distinctly denticulate; awn rough nearly wholly whitish. Stem not tomentose. — Dry places in northern alps r. *Eur.* Norway in Dovrefjeld! *Amer.* Greenl.: Berggren; Vanhoeffen. Alaska: J. M. Macoun. Can. Labrador: Waghorne.

21.**P.piliferum** Schreber.

Leaves short entire short-acuminate or subobtusate, appressed when dry; lamellæ about 30; costa smooth; awn long wholly whitish nearly smooth. Perichetial leaves not lamellate. Capsule short-prismatic or cubic, inclined or suberect. Stem short simple, naked at least in lower half; the foliated part subclavate. — Dry heaths also in alp. regions common. *Eur.* Sweden, Norway! *Amer.* Can.: Macoun.

b. Leaves denticulate not convolute, long and long-subulate, us. plane; lamellæ very numerous, their apical cell not papillate; awn red-brown. Stem and pedicel us. long.

22.**P.attenuatum** Menzies. — P. formosum Hedwig.

Leaves plane crowded, dentate to a long sheath, us. green; wings very narrow; apical cell of lamellæ suboval. Perichetial leaves green not or faintly hyaline in lamina; awn rough. Capsule us. long rectangular-prismatic brown; lid short broad-conic with short point; pedicel reddish. Spores about 0,01 m. m. Stem tomentose near base. — Dry woods often in subalp. districts. *Eur.* not r. Sweden! *Amer.* r. Can.: J. Macoun; Waghorne. Alaska: J. M. Macoun.

* **P.pallidisetum** Funck.

Capsule short-prismatic yellowish; lid nearly flat with narrowly conic beak; pedicel yellowish or pale red. -- Woods r. *Eur.* Sweden, Germany! *Amer.* »U. S.»: Lesq. et Jam.

23.**P.ohioënse** Renauld et Cardot. — P. decipiens Limpricht.

Differs from *P. attenuatum*: Upper leaves (near the perichetial) with shorter sheath; apical cell of lamellæ often transversely dilated. Capsule shorter, narrowed below; lid with narrowly conic beak. Stem not tomentose, us. less long. — Earth and rocks in woods. *Eur.* r. Switzerl.! *Amer.* not r. Can.: Macoun; Waghorne. U. S.: Wetherby; Lapham, com. Cardot.

24.**P.Behringianum** Kindb. rev. bryol. 1894.

Differs from *P. attenuatum*: Leaves laxly disposed, entire below middle of lamina, faintly denticulate above, nearly channelled; cells of sheath shorter and broader. Stem not tomentose. Capsules unknown. — Arctic distr. r. *Amer.* Alaska: J. M. Macoun.

25.**P.commune** L.

Leaves plane crowded, dentate to the sheath, us. rufescent, often falcate when moist; apical cell of lamellæ often emarginate. Perichetial leaves hyaline, us. serrulate near apex; awn entire. Capsule long or short; lid short-rostellate with us. narrow beak. Stem not often tomentose, us. very long. — Heaths and turf-moors princ. in lower regions, less often in alps. *Eur.* common. Sweden! *Amer.* less common. Can.: Macoun (a var. with shorter stem and us blackish calyptra).

* **P.perigoniale** Michaux.

Leaves not or faintly rough at back, us. green; perichetial entire more numerous. Capsule short. Stem and pedicel less long. — Dry places. *Eur.* princ. in southern distr. Switzerl.! *Amer.* Can.: Macoun.

***P.Swartzii** Hartman.

»Leaves short about 5 m. m. Capsule small subcubic with less distinct apophysis. — *Eur.* r. Sweden»: Hartman skand. flora.

26.**P.conorhynchum** Kindb. cat. Canad. m.

Differs from *P. commune*: Leaves channelled green, perichetial longer aristate. Lid of capsule with broadly conic beak. — Bogs in alps r. *Amer* Can. Selkirk mts: Macoun.

IV. Polytrichadelphus Mitten.

27.**P.Lyallii** Mitten. — Polytrichadelphus Mitt.; Polytrichum Kindb. revue bryol. 1894; Oligotrichum Lindb.; Sull. ic. musc.

Leaves dentate above often to the middle of the prominent lamina, not appressed; awn short smooth also in perichetial leaves; lamellæ about 30, their apical cell thick-walled suboval smooth. Perichetial leaves subconvolute densely lamellate at the short point. Capsule subovoid-cylindric strangulate finally brown; peristomial membrane elevate; lid long-rostrate; pedicel yellowish. Resembling *P. alpinum* and *P. sexangulare.* — Swampy places in higher alp. region. *Amer.* Pacif. distr. r. U. S.: Roell; Nowell.

Fam. 18. Georgiaceæ.

74. Georgia Ehrhart.

I. **Tetraphis.** Leaves distinctly costate; upper cells round-hexagonal. Peristomial teeth narrow. Stem elongate.

II. **Tetrodontium.** Leaves not distinctly costate; upper cells suboval. Peristomial teeth broad. Stem nearly indistinct.

I. Tetraphis Hedwig.

A. Pedicel of capsule smooth.

1.**G.pellucida** L. — Mnium L.; Georgia Rabenhorst.

Leaves subovate or suboblong, obtusate us. acute. Perichetial leaves with long sublinear us. obtuse acumen; costa not excurrent. Capsule and pedicel straight. Sterile stems gemmiferous at the top, their buds cup-shaped; upper stem leaves very small. — Rotten logs, sandstone and turfy soil in woods. *Eur.* common. Sweden, Switzerl.! *Amer.* not r. Can.: Macoun; Waghorne. U. S.: Roell.

2.**G.cuspidata** Kindb. revue bryol. 1893.

Leaves subovate short-acuminate acute. Perichetial leaves cuspidate by the long-excurrent costa. Capsule gen. curved; pedicel straight. — *Amer.* Can.: Macoun. U. S: Sullivant and Schrader, com. C. Mueller; Miss C. Cummings, com. Roell.

B. Pedicel rough.

3.**G.trachypoda** Kindb. l. c.

Leaves subovate or ovate-oblong, short-acuminate acute. Perichetial leaves with long sublinear acute acumen; costa not excurrent. Capsule straight; pedicel straight, rough in upper part. — *Amer.* Pacif. distr. r. Can. Brit. Col.: Macoun.

4.**G.geniculata** Girgensohn. — Tetraphis Girg.; Georgia Lindb.

Leaves ovate-lanceolate or ovate-oblong long-acuminate acute. Perichetial leaves ovate-lanceolate with long subulate acumen; costa not excurrent. Capsule straight; pedicel geniculate very rough above the bend. — Rotten wood r. *Amer.* princ. in Pacif. distr. Can.: Macoun; N. Foundl.: Waghorne. Alaska: J. M. Macoun. U. S.: Leiberg, com. Mrs Britton.

II. **Tetrodontium** Schwægrichen.

5.**G.Brownii** Dickson. — Bryum Dicks.; Georgia C. M.

Perichetial leaves ovate-oblong or ovate-lanceolate short-acuminate subacute. Capsule suboval straight very small; pedicel straight smooth. Perigonial leaves subulate-acuminate. Stem bearing at base shoots and long narrowly cuneate often 2—3-lobed leaves, resembling branches of a fallow-buck. — On shady rocks princ. of sandstone, sometimes covered by other mosses. *Eur.* somewhat r. Norway, Sweden! *Amer.* r. »U. S.»: Lesq. et Jam.

Fam. 19. Fissidentaceæ.

75. **Fissidens** Hedwig.

A. Leaves nerveless hyaline narrowly limbate.

I. **Aneuron.** Pedicel of capsule terminal. Plants minute.

B. Leaves costate.

II. **Pachyfissidens.** Leaves pluristratose not limbate, large and entire.

III. **Aloma.** Leaves unistratose not limbate.

a. Peristomial teeth wholly deflexed when dry.

1. **Camptodontii.** Capsule terminal. Plants small. Dioecious. Leaves in few pairs.

b. Peristomial teeth suberect or inflexed when dry.

aa. Capsule terminal; lid very short conic obtuse.

2. **Obtusifolii.** Leaves broad-obtuse entire and small. Plants small.

bb. Lid of capsule rostrate or rostellate, gen. long.

3. **Adiantoidei.** Capsule gen. not terminal. Leaves serrate

above and denticulate below, r. nearly entire, us. large and papillose at back.

4. **Osmundoidei**. Capsule terminal or (in *F. taxifolius*) basilar. Leaves uniformly crenulate all around, gen. not large.

IV. **Eu-Fissidens**. Leaves unistratose limbate (in *F. exiguus* sometimes not limbate), gen. small and entire or at apex faintly denticulate. Capsule terminal or (in *F. floridanus*) lateral; lid gen. rostellate (in *F. rufulus* very short obtuse).

I. Aneuron Kindb.

1.**F.hyalinus** Hooker et Wilson; Sulliv. icon. musc.

Leaves entire in few pairs: lower very small, uppermost suboblong subacute much larger; wings short sinuolate; cells large round-hexagonal. Capsule oval-obovate or suboblong; lid as long; teeth deeply cleft; calyptra conic covering only the beak. — Moist rocky ledges r. *Amer.* »U. S. Ohio»: Sullivant.

II. Pachyfissidens C. Mueller.

2.**F.grandifrons** Bridel.

Leaves rigid sublinear obtuse very densely crowded; cells roundish; costa not percurrent. Tufts dense high. Dioecious. Capsules unknown. — Wet calcareous rocks r. *Eur.* France! Spain: Levier. *Amer.* Can.: Macoun. — »The fruiting *F. grandifrons* from Asia» Barnes and Limpricht is *F. subgrandifrons* C. Mueller in Bot. Zeit. 1864.

III. Aloma Kindb.

1. Camptodontii.

3.**F.Closteri** Austin; Sulliv. icon muscor.

Leaves entire short-ovate subacute often with wanting lamina, very minute and pellucid. Capsule narrow subclavate erect or inclined; lid rostrate. Calyptra mitriform or cucullate. Plant minute. — On the ground r. *Amer.* »U. S.: Austin»: Sullivant.

4.**F.pauperculus** Howe.

Leaves uniformly crenulate, suboblong or short-lanceolate subacute, larger than in the last; cells chlorophyllose pellucid. Capsule narrow subcylindric often slightly curved, cernuous. Calyptra cucullate. Plants small not or very loosely tufted. — Stony ground r. *Amer.* U. S. California: M. A. Howe.

2. Obtusifolii.

5.**F.obtusifolius** Wilson; Sull. ic. m. — F. Arnoldi Ruthe.

Leaves oval-oblong pellucid; costa not percurrent. Capsule suboval. — Wet sandstone or calcareous rocks r. *Amer.* U. S.: Henry, com. Cardot. *Eur.* »Germany»: Limpricht.

3. Adiantoidei.

A. Leaves long sublinear or oblong-lanceolate more or less pellucid. Capsule large; pedicel long-exserted.

6.**F.adiantoides** L. — Hypnum L.; Fissidens Hedwig.

Capsule oval-oblong; lid nearly as long; teeth deeply cleft; pedicel lateral. Leaves strongly serrate above, denticulate below, often hyaline at margins, us. large; costa subpercurrent. Stems us. erect and tufted, forming large mats, gen. radiculose below. — Rocks and earth common. *Eur.* Sweden, Switzerl.! *Amer.* Can.: Macoun.

***F.cristatus** Wilson. — F. decipiens Notaris; Sulliv. icon. musc.

Leaves more crowded and not much large, nearly entire below. Stems us. ascending or decumbent, densely tufted. — On rocks, less often on earth, nearly common. *Eur.* Sweden, Switzerl.! *Amer.* Can.; Macoun. U. S.: Sullivant, com. C. Mueller.

***F.subtaxifolius** Kindb. in bull. soc. bot. ital. 1896.

Leaves minutely serrate above, nearly entire below; costa percurrent or subexcurrent. Stems (as in *F. taxifolius*) short decumbent without rhizoids above base, not forming cohering mats. Capsules not found. — On clayey earth. *Eur.* Switzerl. near Lugano!

7.**F.serrulatus** Bridel.

Capsule subcylindric; lid shorter; teeth deeply cleft; pedicel terminal on the stem or on short lateral branches. Leaves as in *F. adiantoides* but more densely crowded, always large. Tufts loose not radiculose. R. fruiting. — Earth and rocks r. *Eur.* Italy: Bottini. Portugal: Levier.

8.**F.polyphyllus** Wilson.

Differs from the last: Peristomial teeth cleft only to middle. Leaves entire or near apex faintly denticulate or serrate. Stem us. much longer. Very r. fruiting. — Wet shady rocks r. *Eur.* France: Camus, com. Husnot. Engl.: Manchester Cryptog. Society.

9.**F.polypodioides** Hedwig; Sulliv. ic. musc.

Capsule piriform-clavate with very wide mouth, not strangulate; lid shorter; teeth deeply cleft; pedicel as in *F. serrulatus.* Leaves entire large densely crowded; costa subpercurrent. Stem often long and simple, radiculose only at base. Differs from the 3 preceeding species in annulus of capsule revoluble. R. fruiting. — Wet rocks r. *Amer.* »U. S. southern states»: Sulliv. (Venezuela: Fendler, com. C. Mueller).

B. Leaves short suboblong nearly opake below, pellucid at apex. Capsule small; pedicel scarcely exserted above upper stem-leaves.

10.**F.subbasilaris** Hedwig; Sullivant ic. musc.

Capsule oblong-cylindric; lid much shorter; teeth not long and not deeply cleft with subulate not filiform-pointed legs; pedicel emerging from lower part of stem. Leaves small, denticulate below, stronger serrate near apex, subobtuse, not hyaline at margins; costa subpercurrent. Tufts low; stems fasciculate — On trees r. *Amer.* Can.: Dearness, com. Macoun; Drummond, com. Macoun. U. S.: Sullivant, com. C. Mueller.

4. Osmundoidei.

A. Leaves gen. large; costa excurrent. Stems not tufted. Pedicel of capsule basilar.

11.**F.taxifolius** L. — Hypnum L.; Fissidens Hedwig.

Leaves suboblong hyaline-crenulate often acute, not densely crowded. Capsule suboblong; lid nearly as long. Stems fasciculate; branches simple not long us. decumbent. — On earth. *Eur.* not r. Switzerl.! Sweden: S. Hardin; M. Huss. Engl.: Rogers. *Amer.* »U. S.»: Lesq. et Jam.

B. Leaves not large; costa not excurrent. Pedicel terminal.

a. Tufts tomentose often high. Calyptra mitriform lobate.

12.**F.osmundoides** Swartz. — Dicranum Sw.; Fissidens Hedwig.

Leaves suboblong subobtuse often apiculate, not opake, in many pairs; costa subpercurrent. Capsule oblong-oval. — Wet rocks and heaths also in alps. *Eur.* not r. Sweden, Norway! *Amer.* Can.: Macoun.

b. Stems low not tomentose, not or very loosely tufted. Calyptra cucullate.

13.**F.exilis** Hedwig.

Leaves very pellucid suboblong subacute in few pairs: upper sometimes sublinear-lanceolate; costa percurrent. Capsule thick oval-oblong. Monoecious. Plants very small. — On earth. *Eur.* not r. Sweden: C. Hartman; Arvén. France: Husnot.

* **F.Hallii** Austin.

»Plants somewhat larger; dioecious. — *Amer.* r. U. S. Texas: E. Hall»: Lesq. et Jam.

14.**F.Ravenelii** Sullivant icon. muscor.

Leaves small opake sublinear or broad-lanceolate subacute in 2—10 pairs; costa subpercurrent. Perichetial leaves with broadly limbate wings. Capsule suboblong gen. erect; lid rostellate much shorter. Dioecious. — Damp earth r. *Amer.* U. S.: Langlois, com. Cardot.

15. **F. Garberi** Lesq. et Jam. man.

Differs from the last: Leaves somewhat larger shorter more obtuse, sometimes short-acuminate; costa shorter. Perichetial leaves with narrowly limbate wings. Capsule oval. »Sometimes synoecious»: Schimper. — Trees and earth r. *Amer.* Can.: Macoun.

16. **F. Donnellii** Austin. — F. pauperculus Howe ?

»Leaves small: lower broad, upper longer and narrower linear-lanceolate in 3—4 pairs; basal lamina incomplete; cells much larger than in *F. Ravenelii*; costa not percurrent. Perichetial leaves with not limbate wings. Capsules unknown; pedicel very short. Dioecious»: Lesq. et Jam. man. and Barnes bot. gaz. 1887. — Base of trees r. *Amer.* »U. S., south. st.»: Lesq. et Jam.

IV. Eu-Fissidens.

A. Inner leaf-cells opake.

a. Lid of capsule very short obtuse.

17. **F. rufulus** Bryol. eur. — F. ventricosus Sulliv. icon. m.

Leaves broad somewhat large, oblong or oblong-lanceolate subobtuse crowded, broadly yellowish or reddish limbate; costa percurrent. Capsule obovate dark green; teeth deeply cleft; pedicel short. Stem 1—4 c. m. long. Very r. fruiting. — Stones in streams r. *Eur.* Engl.: Rogers. Austria: Sauter, com. Husnot. — *Amer.* »Calif.»: Sulliv.

b. Lid rostrate.

18. **F. limbatus** Sullivant.

Leaves small oblong-lanceolate apiculate or short-acuminate, pale-limbate entire; cells seriate; costa subpercurrent. Capsule asymmetric suboval green; lid half as long; teeth deeply cleft; pedicel terminal. Stem 2—5 m. m. long. — *Amer.* Pacif. distr. r. U. S.: Roell; Howe.

19. **F. floridanus** Lesq. et Jam.

»Leaves long cultriform crenulate at apex; costa not percurrent. Capsule oblong-oval; lid long-rostrate; pedicel lateral. Stem 1—3 c. m. long — *Amer.* r. U. S. south. states: Garber»: Lesq. et Jam.

B. Leaves more or less pellucid, not large. Lid shorter than half capsule. Plants small.

a. Leaves with thick broad limb. Stem us. somewhat long.

20. **F. rivularis** (Spruce as var.) Bryol. eur.

Leaves broadly cultriform acute or abruptly short-acuminate entire with pale limb; costa percurrent. Capsule straight cernuous. Stem to 3 c. m. long; male flowers axillary. — In water r. *Eur.* France: Husnot. *Amer.* »U. S.: Lesq. et Jam.

21.**F.crassipes** Wilson.

Leaves as in the last but with yellowish limb, sometimes crenulate near apex; costa not percurrent. Capsule us. straight erect. Stem to 4 c. m. long. Dioecious or monoecious with not axillary male flowers. — In water r. *Eur.* Switzerl.! France: Berthoumieu; Camus.

* **F.Mildei** Schimper. — Polygamous. — *Eur.* r. Switzerl.: Culmann, com. Husnot.

b. Leaves gen. with thin narrow limb, not gradually acuminate; costa gen. not excurrent. Stem us. very short.

22.**F.bryoides** L. — Hypnum L.; Fissidens Hedwig.

Leaves broadly cultriform acute us. long. Capsule straight gen. erect. Stem with axillary male flowers. — Earth and stones not r. *Eur.* Sweden, Switzerl.! France: Husnot. Engl.: Rogers. *Amer.* Can.: Macoun; Drummond.

* **F.cyprius** Juratzka.

»Polygamous. — *Eur.* r. Italy»: Limpricht.

* **F.viridulus** Swartz. — Dicranum Sw.; Fissidens Wahlenberg. Fruiting stem without male flowers. — *Eur.* not r. Engl.: Rogers. Sweden: P. Olsson. *Amer.* Can. common: Macoun.

23.**F.incurvus** Starke.

Leaves us. as in the last. Capsule us. cernuous often curved. Stem without axillary male flowers. — Earth and stones not r. *Eur.* France: Husnot. *Amer.* Can.: Macoun. U. S.: Langlois, com. Cardot.

* **F.tamarindifolius** Don. — Hypnum Don; Fissidens Bridel.

Leaves short subovate-oblong. Capsule nearly straight. — On earth r. *Eur.* Italy! Sweden: M. Huss. *Amer.* Can.: Macoun.

* **F.pusillus** Wilson.

Leaves smaller somewhat long. Capsule straight erect. — Rocks not r. *Eur.* Sweden, Norway, Switzerl.! France: Husnot. Engl.: Rogers. *Amer.* Can.: Macoun.

* **F.minutulus** Sullivant icon. musc.

Leaves small narrow suboblong or oblong-lanceolate very narrowly limbate; basal lamina often incomplete. Capsule straight erect or inclined. Not much distinct from *F. incurvus* **pusillus*. — Moist rocks. *Amer.* Can.: Macoun. *Eur.* »Engl.»: Braithwaite.

* **F.Bambergeri** Schimper; Husnot muscol. gall.

Leaves somewhat small and not long, often incompletely limbate. — Sandy soil r. *Eur.* »Austria»: Schimp. syn. *Amer.* »U. S.»: Cardot.

* **F.texanus** Lesquereux.

»Leaves broader; costa sometimes short-excurrent. Capsule short-rostrate. — *Amer.* r. U. S. Texas: Wright»: Lesq. et Jam.

24.**F.algarvicus** Solms Laubach; Husnot m. gall.

Differs from *F. incurvus *pusillus* in narrower leaves, the upper sublinear more acuminate and broadly limbate; cells sometimes suboval. — Clayey soil r. *Eur.* France: Corbière, com. Husnot.

25.**F.exiguus** Sullivant ic. musc. — F. falcatulus Renauld et Cardot.

Differs from other species of subg. *Eu-Fissidens* in leaves gen. not limbate at least on lamina. Upper leaves oblong-lanceolate subacute. Capsule suboval-oblong erect. Plant very small. Dioecious. — Earth and stones r. *Eur.* »Engl.»: Braithwaite. *Amer.* Can.: Macoun. U. S.: Sullivant, com. C. Mueller.

* **F.subimmarginatus** Philibert; Husnot muscol. gall.

Leaves with broadly limbate wings. — *Eur.* »France»: Philibert. *Amer.* Can.: Macoun.

c. Leaves gradually acuminate; costa excurrent.

26.**F.Sardagnæ** Venturi revue bryol. 1883.

»Leaves in 3—4 pairs: upper narrowly linear-lanceolate limbate by 2—3 rows of linear cells, rigid when dry; basal lamina incomplete; cells irregular hexagonal larger than in *F. incurvus *pusillus.* Capsule erect suboval, when dry cylindric; lid unknown. Plant minute. — *Eur.* Sardinia»: Venturi.

76. **Conomitrium** Montagne.

1.**C.Julianum** Savi. — Fontinalis Savi; Conomitrium Mont.

Leaves large long sublinear obtuse entire not limbate, in many pairs; wings short; cells round-hexagonal; costa abbreviate. Capsule small green piriform wide-mouthed; lid longer; teeth approached very short sometimes cleft nearly to middle; pedicel terminal on a small lateral branch, not much longer than capsule; calyptra mitriform. Tufts green very loose. Stem often long. Monoecious but r. fruiting. — In water viz. in fountains. *Eur.* somewhat r. Switzerl.! Sweden: Arnell. Germany: Baur. Italy: Arcangeli. *Amer.* r. Can.: Macoun. U. S.: Sullivant, com. C. Mueller.

2.**C.Hallii** Sullivant et Lesquereux; Sull. icon. m.

Differs from the last: Leaves much narrower, setaceous gradually narrowed, in 5—10 pairs; wings shorter; outer basal cells narrower, short-rectangular in many rows. Capsule oval-oblong on elongate branches, with a not longer lid; pedicel 3—4 times longer; teeth more distant, long subulate not cleft; calyptra short cucullate. Tufts blackish green when dry. Stem about 3 centim. long. — Submerged stones and logs r. *Amer.* U. S.: Leiberg, com. Mrs Britton.

Fam. 20. Splachnaceæ.

77. Splachnum L.

I. **Umbracularia.** Apophysis open umbraculiform very large. Leaves from round-oval base abruptly long-acuminate.

II. **Ampullaria.** Apophysis inflated not open, very much broader than capsule; pedicel reddish.

III. **Pseudo-Haplodon.** Neck solid, not much broader or sometimes a little narrower than capsule; pedicel yellowish.

I. Umbracularia C. Mueller.

1.**S. rubrum** Montin.

Capsule brown; apophysis campanulate purplish red; pedicel red. Leaves us. denticulate all around. — On dung in peat-bogs in northern districts r. *Eur.* Sweden! *Amer.* Can.: Hay, com. Macoun.

2.**S. luteum** Montin.

Capsule pale brown; apophysis yellow campanulate finally plane; pedicel orange. Leaves often nearly entire. — North. distr. r. *Eur.* Sweden! *Amer.* Alaska: Dawson, com. Macoun. »Can.: Drummond»: Macoun.

3.**S. melanocaulon** (Wahlenberg as. var.) Schwægrichen.

Capsule and pedicel brownish; apophysis pale yellow soon becoming plane. — Very r. *Eur.* »Lapland»: Wahlenb. *Amer.* »Can.: Rocky mts»: Macoun and Mitten.

II. Ampullaria C. Mueller.

4.**S. ampullaceum** L.

Capsule with piriform reddish yellow finally lilac apophysis; pedicel often very long. Leaves more or less narrow often subulate-acuminate; the upper serrate shorter. Sometimes monoecious. — In humid pasturages less r. *Eur.* Sweden not r.! France: Du Noday. *Amer.* Can.: Macoun; Waghorne. U. S.: Henderson, com. Cardot.

5.**S. vasculosum** L.

Capsule with globose purplish finally blackish red apophysis; pedicel not much long. Leaves broad gen. suboval with broad short obtuse acumen, r. denticulate; the lower broader. —

Peat-bogs in northern alps r. *Eur.* Sweden, Norway! Scotl.: Rogers. Finl.: Lindberg. *Amer.* »Can.: Drummond»: C. M. »Sitka»: Lesq. et Jam. »Greenl.»: Berggren.

III. Pseudo-Haplodon Kindb.

6.**S.sphæricum** L. fil. — »S. pedundulatum Hudson»: Lindb.

Capsule with reddish yellow finally blackish (globose, ovoid or piriform) neck; pedicel often very long, sometimes very short. Leaves subulate-acuminate gen. oblong sometimes denticulate; the lower very much smaller. — Princ. in northern alps. *Eur.* Norway not r.! Austria: Venturi. *Amer.* Can.: Drummond; Macoun.

78. **Haplodon** (R. Brown, Lindb. as subg.) Kindb. n. genus.

1.**H.Wormskioldii** Hornemann. - Splachnum Horn.

Leaves entire from subovate base abruptly acuminate. Capsule small reddish finally blackish, shorter than the small suboval neck and scarcely narrower or sometimes broader when dry; pedicel pale yellow setaceous 1—3 c. m. long. Tufts high dense. — Northern princ. arctic districts (us. on dead lemmings) r. *Eur.* Norway! Spetsbergen: Berggren. *Amer.* Can.: Waghorne. Alaska: J. M. Macoun. Greenl.: Breutel; Berggren.

79. **Tetraplodon** Bruch et Schimper.

A. Leaves long narrow gradually subulate-acuminate us. dentate or denticulate. Pedicel thin not much emerging above the tufts.

1.**T.angustatus** L. fil. — Splachnum L. fil.; Tetraplodon B. S.

Capsule greenish finally pale brown or yellow, much shorter than neck; pedicel pale setaceous. Leaves gen. denticulate above; costa long-excurrent. Tufts dense often high. — Dung and rotten animals princ. in alps, r. *Eur.* Norway! Sweden: M. Huss. Austria: Husnot M. G. *Amer.* Can.: Macoun; Waghorne.

2.**T.australis** Sullivant et Lesquereux; Sull. ic. m.

Capsule finally brown scarcely shorter, in dry state broader, than neck; pedicel brownish capillary. Leaves very narrow sometimes fimbriate, r. nearly entire; costa gen. percurrent, in uppermost leaves often excurrent. Tufts low less dense. — *Amer.* r. U. S.: Austin, com. Mrs Britton. »Can.»: Lesq. et Jam.

B. Leaves broad entire abruptly narrowed. Pedicel subfiliform somewhat thick and exserted above the very compact tufts.

3.**T.mnioides** L. fil. — Splachnum L. fil.; Tetraplodon B. S.

Capsule green-yellow or pale red finally red; neck red-rufous much longer; pedicel reddish often long. Leaves suboblong;

costa excurrent. — Dung and rotten animals princ. lemmings. *Eur.* Norway not r.! Sweden: M. Huss. *Amer.* Greenl.: Berggren. Alaska: J. M. Macoun. Can.: Macoun; Waghorne.

4.**T.urceolatus** Bridel. — Splachnum Brid.; Tetraplodon B. S. Capsule brownish not shorter than the blackish neck; pedicel yellow about 1 c. m. long. Leaves suboval apiculate; costa not distinctly confluent with the point. — Alp. region r. *Eur.* Austria: Schimper; Breidler. Switzerl.: Muehlenbeck, com. Husnot. *Amer.* Can.: Drummond, com. Macoun.

80. **Dissodon** Greville et Arnott.

A. Leaves distant. Capsule with properistome; pedicel setaceous very long. Spores about 0,03 m. m.

1.**D.splachnoides** Thunberg. — Weisia Th.; Dissodon Gr. et Arn. Leaves sublingulate r. denticulate above. Capsule brown roundish finally dilated at mouth, gen. shorter than neck. Tufts sometimes high. — Bogs in alps, r. in lower regions, r. *Eur.* Norway! Sweden: Thedenius. Scotl.: Manchester Cryptog. Soc. *Amer.* Can.: Macoun.

B. Leaves crowded entire. Capsule without properistome; pedicel thickish not long. Spores about 0,04 m. m.

2.**D.Froelichii** Hedwig. — Splachnum H.; Dissodon G. et A. Leaves suboblong. Capsule reddish oval not shorter than neck; pedicel about 1,5 c. m. long. — Earth and rocks in alp. regions r. *Eur.* Norway! Switzerl.: Schimper; H. Forssell. *Amer.* Greenl.: Berggren. Can.: Macoun.

3.**D.Hornschuchii** Greville et Arnott.

Leaves suboval. Capsule pale brown suboblong shorter than neck; pedicel about 0,5 c. m. long. Stem very short. — Earth on alp. rocks r. *Eur.* Austria: Breidler, com. Warnstorf. *Amer.* »U. S.»: Lesq. et Jam.

81. **Tayloria** Hooker.

A. Leaves with excurrent costa. Peristomial teeth not cleft.

1.**T.Rudolphi** Hornschuch. — Eremodon Hsch.; Tayloria Br. eur. Leaves sublingulate short-acuminate. Capsule yellowish oblong longer than the narrow neck; teeth pale yellow loosely appressed to capsule or erect when dry; lid conic; pedicel thick yellowish. Tufts high. — On trees r. *Eur.* Austria: Schimper; Reuter.

B. Costa of leaves not excurrent.

a. Peristomial teeth entire appressed to capsule when dry.

2.**T.serrata** Hedwig. — Splachnum H.; Tayloria B. S.

Leaves obovate or suboblong short-acuminate acute. Capsule suboblong yellowish brown not much thicker than neck when dry; teeth yellowish brown loosely appressed when dry; lid convex; pedicel somewhat thick. — In bogs or on base of trees. *Eur.* not r. in southern alps. Switzerl.! Austria: Schimper. *Amer.* Can.: J. Macoun; Moser. Alaska: J. M. Macoun.

3.**T.tenuis** Dickson. — Splachnum Dicks.; Tayloria Schimper. Differs from the last: Capsule shorter, brownish, suboval or finally subglobose and much thicker than neck when dry; teeth blackish brown strongly appressed when dry; pedicel thinner. — Turfy soil princ. in northern distr., r. *Eur.* Norway! Sweden!; E. Adlerz; A. Grape. Switzerl.: Schimper. *Amer.* Can.: Macoun; Waghorne.

b. Peristomial teeth soon partite, deflexed or patent, very hygroscopic.

4.**T.splachnoides** Schleicher. — Hookeria Schl.; Tayloria Hooker. Leaves oblong or oblong-lanceolate us. short-acuminate. Capsule us. oblong-cylindric; neck much narrower but. us. not longer; columella often long-exserted; teeth dark red; lid us. conic often rostellate; pedicel thin. — Peat-bogs or wet earth on rocks in alps r. — *Eur.* Norway! *Amer.* Can.: Allen, com. Macoun.

* **T.acuminata** (Huebener as var.) Hornschuch.
Leaves long-acuminate. Capsule suboval often shorter than neck; columella not exserted; lid sometimes convex. — Bogs in alps r. *Eur.* Norway! *Amer.* Can.: Macoun; Drummond n. 47; Waghorne in herb. C. M.

82. **Oedipodium** Schwægrichen.

1.**Oe.Griffithii** Dickson. — Bryum Dicks.; Oedipodium Schw. Leaves obovate not recurved, often with sinuous borders. Capsule subglobose orange-brown; lid subconvex; columella not exserted; neck 1—2 c. m. long. Stem often with obovate axillary buds — Crevices of rocks and wet peaty soil in alps r. *Eur.* Scotl.: H. Boswell; T. Rogers. Sweden and Norway: E. Nyman. *Amer.* »Greenl.»: Berggren.

Fam. 21. **Dicranaceæ.**

83. **Octoblepharum** Hedwig.

1.**O.albidum** Hedwig.
Leaves patent from short broad base abruptly narrowed to the slightly channelled linear short-acuminate near apex serrate acumen; outer basal cells rhomboidal hyaline, the others somewhat dusky subquadrate. Capsule small oval long-rostrate.

Tufts us. not high. Monoecious. — On trees in tropical districts. *Amer.* U. S., Florida: Fitzgerald, com. Renauld.

84. **Leucobryum** Hampe.

A. Leaves thick entire; marginal cells gen. short-rectangular, the lowest longer.

1.**L.glaucum** L. — Bryum L.; Leucobryum Schimper.

Leaves from oval-oblong concave or channelled base gradually tapering to a longer sublinear channelled or subconvolute acumen, not appressed when dry, patent when moist. Capsule oblong-cylindric often arcuate, more or less distinctly strumose, sulcate when dry. Plants glaucous green or whitish. Dioecious r. fruiting. — Wet heaths and woods common. *Eur.* Sweden, Switzerl.! *Amer.* Can.: Macoun. U. S.: Wetherby.

2.**L.minus** Sullivant; Bescherelle.

Differs from the last: Upper leaves very much smaller and shorter with broad-oval base and not longer acumen, appressed when dry with patent points, suberect when moist. Capsule small suboval. Plants whitish. -- Princ. on rotten wet logs r. *Amer.* U. S.: Fitzgerald, com. Renauld; Langlois and Sawyer, com. Cardot. *Eur.* »Engl.»: Braithwaite.

B. Leaves thin sinuolate; marginal cells long-rectangular.

3.**L.Leanum** Sullivant. — Campylopus Sull. ic. m.; Leucobryum Kindb.

Leaves from narrowly oblong base tapering to a subulate near apex sinuolate, channelled or convolute acumen, erect-patent. Stem often with head-like shoots; their leaves small oval-oblong or linear. Tufts low glaucous or whitish. Capsules unknown. — Decayed logs r. *Amer.* U. S.: Purpus, com. Cardot.

85. **Distichium** Bruch et Schimper.

1.**D.capillaceum** Swartz. — Mnium Sw.; Distichium B. S.

Nearly all leaves long-pointed; perichetial also abruptly narrowed. Capsule reddish subcylindric or oblong gen. erect; teeth pale red. Tufts glossy. — Rocks princ. of limestone. *Eur.* nearly common. Sweden, Norway, Switzerl.! *Amer.* Can.: Macoun; Waghorne.

2.**D.inclinatum** Ehrhart. — Swartzia E.; Distichium B. S.

Lower leaves with shorter point; perichetial more gradually acuminate. Capsule suboval finally red-brown, more or less inclined; teeth red. Tufts less or not glossy. — Rocks princ. in alp. and northern districts. *Eur.* not r. Norway, Switzerl.! France: Husnot. *Amer.* Can.: Macoun; Waghorne.

86. Aongstroemia Bruch et Schimper.

1.**Ao.longipes** Sommerfelt. — Weisia Somf; Aongstroemia B. S.

Leaves ovate-oblong entire not recurved, very small, appressed when dry: upper acuminate sheathing; costa not percurrent. Capsule ovoid smooth erect; lid rostellate; teeth red below, yellow above, sometimes not cleft; pedicel about 1 c. m., stem shorter. Tufts loose. Male flowers discoid. Dioecious. — Earth princ. on old roads in alps r. *Eur.* Norway! Sweden below alps: J. Persson. *Amer.* Can.: Macoun.

87. Trematodon Michaux.

I. **Eu-Trematodon.** Capsule subcylindric; neck long abruptly narrowed; teeth long with prominent basal tube; pedicel long. II. **Pseudo-Bruchia.** Capsule round-oval when ripe; neck short gradually narrowed; teeth short broad without prominent tube; pedicel short.

I. Eu-Trematodon.

A. Capsule not much shorter than neck. Leaves entire; costa long-excurrent.

1.**T.ambiguus** Hedwig. — Dicranum H.; Trematodon Hornschuch.

Leaves from ovate or ovate-oblong not truncate base abruptly narrowed to a subulate in upper part by costa filled acumen. Perichetial leaves gradually acuminate; costa more or less excurrent often denticulate at apex. Peristomial teeth red us. cleft. -- Wet sand or peat-bogs princ. in northern distr. *Eur.* Sweden not r.!; Miss O. Cron. Norway: W. Baur. Germany: Huebner. *Amer.* r. Can.: Macoun; Waghorne.

2.**T.acicularis** Kindb. revue bryol. 1896.

Leaves broadly suboval truncate above, pointed by costa; perichetial nearly similar but larger and longer. Peristomial teeth orange split in middle; basal tube red. — Bogs r. *Amer.* Can. Brit. Col.: Macoun.

B. Capsule with twice longer neck. Leaves often denticulate; costa not or scarcely excurrent.

3.**T.longicollis** Michaux.

Leaves narrow gradually subulate; perichetial nearly similar. Peristomial teeth pale red often entire. — Moist clay or sandy soil. *Eur.* r. Italy: Gendano, com. Husnot (a var. with entire leaves). *Amer.* not r. in southern distr. U. S.: Sullivant, com. C. Mueller.

II. Pseudo-Bruchia Kindb.

4. **T. brevicollis** Hornschuch.

Leaves concave subovate short-acuminate very small, nearly appressed when dry; costa not or scarcely excurrent. Perichetial leaves ovate-oblong more distinctly acuminate. Peristomial teeth red entire or faintly perforate. Stem very short. Tufts small dark green. — Earth and rocks in alp. regions r. *Eur.* Norway! *Amer.* »Greenl.»: Berggren.

88. Ditrichum Timm.

A. Leaves sheathing; costa rough at back.

I. **Trichodon.** Dioecious.

B. Leaves not sheathing; costa smooth. Perichetial leaves not (exc. *D. vaginans* and *D. homomallum*) sheathing.

II. **Sælania.** Leaves carinate often covered with a glaucous meal. Monoecious.

III. **Leptotrichum.** Leaves not carinate. Often dioecious.

1. **Xanthopodia.** Pedicel of capsule yellow. Leaves long-subulate; costa long-excurrent. Monoecious or paroecious.

2. **Erythropodia.** Pedicel finally red. Leaves often short-subulate. Dioecious.

I. Trichodon Schimper.

1. **D. tenuifolium** Schrader. — Trichostomum Schrad.; Ditrichum Lindberg; Trichodon cylindricus Schimper.

Leaves abruptly narrowed to a long subulate-setaceous denticulate by the long-excurrent costa nearly filled point, curled or patent when dry; cells narrow-rectangular. Capsule smooth narrow-cylindric curved when young; teeth red papillose articulate; pedicel long yellowish or pale red. Tufts low not tomentose. — Wet sand princ. in alps. *Eur.* Norway, Sweden, Switzerl.! Austria: Breidler. *Amer.* Can.: Macoun.

2. **D. oblongum** Lindberg. — Trichodon Lindb. in K. W. A. Foerhandl. (Roy. Acad. in Stockholm) 1864; Ditrichum Kindb.

Leaves abruptly narrowed to the entire or indistinctly denticulate not long acumen, which in upper part is filled by the short-excurrent costa, not or faintly flexuous; cells short-rectangular at least the upper; pedicel red short; »peristomial teeth pale brown hyaline smooth indistinctly articulate»: Lindb. l. c. Tufts dense but not tomentose, about 3 c. m. high when barren, lower when fertile. — On earth in arctic districts r. *Amer.* Greenl.: Berggren. *Eur.* Spetsbergen; R. Gyllencreutz. — The barren specimens are resembling *Ceratodon purpureus*, but leaves not are revolute; in fertile ones from Spetsbergen few capsules are evolute (but unripe), their lids very short obtuse.

II. Sælania Lindberg.

3.**D.glaucescens** Hedwig. — Trichostomum Hedw.; Ditrichum Hampe; Leptotrichum Hampe; Schimper; Sælania cæsia Lindb.; Ditrichum montanum Leiberg bull. Torr. club 1893.

Leaves sublinear or narrowly ovate-lanceolate acute serrulate above, patent when dry; cells gen. short-rectangular or quadrate; costa percurrent. Capsule oblong-cylindric straight sulcate when dry; teeth purple, remotely nodose above; pedicel yellowish red. Tufts not high. — Earth on rocks princ. in alps not r. *Eur.* Sweden, Norway, Switzerl.! Austria: Venturi. *Amer.* Can.: J. Macoun. Alaska: J. M. Macoun. Greenl.: Vanhoeffen.

III. Leptotrichum Hampe; Schimper.

1. Xanthopodia.

A. Leaves gradually narrowed from ovate or lanceolate base, denticulate above.

4.**D.pallidum** Schreber. — Bryum Schreb.; Ditrichum Hampe.

Leaves often denticulate to middle; upper cells long linear; upper basal cells suboblong; costa broad not well-defined. Capsule suboblong; annulus revoluble; lid rostellate; pedicel often very long. Tufts low and glossy. — Rocks and stone-walls gen. r. *Eur.* princ. in southern districts. Switzerl.! Germany: Herpell. France: Husnot. *Amer.* Can.: Macoun. U. S.: Sawyer, com. Cardot.

5.**D.Schimperi** Lesquereux. — Leptotrichum Lesq.; Sulliv. icon. muscor.; Ditrichum Kindb.

Differs from the last: Leaves longer and nearly entire; costa narrower. Capsule smaller and less sulcate; pedicel less long; teeth indistinctly articulate; peristomial tube orange more distinct; spores much larger. — Wet earth and rocks r. *Amer.* Pacif. distr. Can.: Can.: Macoun. U. S.: Bolænder, com. Renauld; Howell, com. Cardot.

* **D.flexifolium** Renauld et Cardot. — Trichodon Ren. et C.; Ditrichum Kindb.

Leaves less long and more flexuous; upper cells shorter. Tufts green. Capsules unknown. — Sandy soil r. *Amer.* U. S.: Sawyer, com. Cardot.

»*Ditrichum Breidleri* Limpricht (plant hybrid ?) — Agrees with *D. pallidum* in shape of leaves and in yellow pedicel. Differs from it: Plants scarcely 4 m. m. high, stem 1 m. m. Capsule oval not striate; lid obtuse subpersistent; teeth short small brittle; annulus not distinct; pedicel thick not much exserted above upper leaves. — On wet earth. *Eur.* Austria, in few specimens together with *Ditrichum pallidum* and *Pleuridium palustre:* Breidler»: Limpricht Laubm. Deutschl.

B. Leaves entire abruptly narrowed from ovate base.

6.**D.subulatum** Bruch. — Leptotrichum Bruch; Ditrichum Lindb.

Leaves otherwise as in *D. pallidum.* Capsule smaller, suboval faintly sulcate; annulus none; pedicel not long. — Clayey places on rocks r. *Eur.* southern districts. France: Philibert. Italy: Bottini; Arcangeli.

2. Erythropodia.

A. Tufts very tomentose, us. high and glossy. Leaves gen. large; alar cells sometimes distinct subquadrate; costa long-excurrent.

7.**D.flexicaule** Schleicher. — Didymodon Schl.; Ditrichum Hampe.

Leaves long-subulate often denticulate, not appressed; cells irregular gen. narrow: basal shorter often reddish; costa often broad. Capsule brown. R. fruiting. — Rocks and stony ground, common. *Eur.* Sweden, Norway, Switzerl.! Austria, fruit.: Venturi. *Amer.* Can.: Drummond; Macoun.

* **D.densum** (Schimper as var.) Kindb.

Leaves shorter and less patent; cells gen. short, upper suboval. Tufts more dense and less glossy. — *Eur.* princ. in northern districts. Sweden common, often fruiting!; M. Huss. *Amer.* Can.: Macoun.

B. Tufts not or sparingly radiculose, us. low and not glossy. Leaves gen. not large; alar cells not distinct.

a. Leaf-cells gen. narrow, rectangular.

aa. Perichetial leaves sheathing. Peristome without basal tube.

8.**D.vaginans** Sullivant. — Trichostomum Sull. ic. m.; Ditrichum Hampe.

Leaves from ovate base gradually short-subulate or acute, entire or nearly so, appressed when dry, erect when moist; cells narrow; costa percurrent or short-excurrent Tufts eradiculose not glossy, 1 or r. 2 c. m. high. — Earth and wet rocks r. *Eur.* Norway: Geheeb, com. C. Mueller. Belgium: Gravet. France: Lamy, com. Husnot. *Amer.* Can.: Macoun.

9.**D.homomallum** Hedwig. — Didymodon Hedw.; Ditrichum Hampe.

Leaves (at least on fruiting stem) long subulate gen. entire, us patent; cells gen. narrow; costa (at least on leaves of fruit. stem) long-excurrent. Tufts us. low. Sterile shoots often short-subulate with subpercurrent costa. — Sandy ground princ.

in subalp. districts. *Eur.* not r. Sweden, Norway, Germany, Switzerl.! Finl.: Brotherus. *Amer.* r. Can.: Drummond. U. S.: Roell.

* **D.zonatum** Bridel. — Weisia Brid.; Ditrichum Limpricht.

Leaves acute or short-subulate, appressed when dry, suberect when moist; costa percurrent or short-excurrent. Tufts dense but sparingly radiculose, sometimes 3—4 c. m. high. Capsules unknown. — Rocks in alp. region r. *Eur.* Germany: Limpricht. Austria: Breidler. Sweden: E. Nyman. Norway: Kaurin.

bb. Perichetial leaves not sheathing. Peristome with distinct basal tube.

10.**D.tortile** Gmelin. — Mnium Gm.; Ditrichum Lindb.

Leaves gen. somewhat long-subulate and not or sparingly denticulate, sometimes slightly recurved, us. not appressed when dry; costa percurrent or short-excurrent. Tufts eradiculose. — Sandy places also in alps. *Eur.* Sweden, Switzerl.! France: Husnot m. gall. *Amer.* Can.: Macoun; Waghorne.

* **D.pusillum** Hedwig. — Trichostomum H.; Ditrichum Timm.

Stem lower; leaves shorter and less patent; costa scarcely excurrent. — *Eur.* not r. Sweden: M. Huss. France: Husnot m. gall. *Amer.* Can.: Drummond; Macoun.

* **D.nivale** C. Mueller. — Leptotrichum C. M.; Ditrichum Limpricht.

Leaves appressed when dry, suberect when moist; costa fainter, excurrent in upper leaves. Capsule smaller. — Alp. rocks r. *Eur.* Austria: Berggren, com. Grœnwall.

b. Leaf-cells round-quadrate. Capsules unknown.

11.**D.elatum** Kindb. n. sp. — Leptotrichum flexicaule *brevifolium Kindb. cat. Can. m.

Leaves small gen. entire, from short base abruptly tapering to the not much longer acute or subulate acumen, appressed when dry, patent when moist; costa percurrent. Tufts loose eradiculose not glossy, to 6 c. m. high. — Alp. rocks r. *Amer.* Can. Rocky mts: Macoun.

12.**D.Macounii** C. M. et Kindb. — Distichium C. M. et K. l. c.; Ditrichum Kindb.

Leaves small sometimes denticulate at apex, from short base abruptly tapering to a longer subulate acumen, faintly appressed when dry; costa percurrent. Tufts dense, radiculose below, 2—3 c. m. high. — Alp. rocks r. *Amer.* Can. Brit. Col.: J. Macoun.

89. **Cynodontium** Schimper.

I. **Eu-Cynodontium.** Capsule striate; teeth long persistent. Leaves carinate much recurved.

II. **Oreoweisia.** Capsule smooth; teeth short brittle. Leaves carinate faintly recurved near base.

III. **Pseudo-Philonotis.** Leaves concave not recurved. Stem julaceous. Capsule unknown.

I. Eu-Cynodontium.

A. Leaves strongly mamillose on both sides, broadly acuminate gen. obtusate at apex; alar cells indistinct. Capsule (exc. *C. strumulosum*) not annulate.

a. Capsule costate; teeth papillose. Leaves long large.

1.**C.gracilescens** Schimper syn. — Oncophorus Lindb.; Braithwaite brit. mossfl. in part.

Leaves gen. acute, perichetial with long linear acumen. Capsule oval-oblong or finally cylindric, often inclined or suboblique; pedicel straight. -- Rocks princ. in alps r. *Eur.* Sweden, Norway, Switzerl.! Austria: Venturi. *Amer.* »Greenl.»: Lange Greenl. fl. »U. S.»: Lesq. et Jam.

2.**C.cirratum** Hornschuch. — Campylopus Hsch.; Brid.; Cynodontium Kindb; Oncophorus Lindb.

Leaves gen. obtuse, inner perichetial short-apiculate. Capsule oval with dark red stripes; pedicel arcuate in younger state when moistened. — Rocks princ. in alps r. *Eur.* Norway! *Amer.* »U. S.»: Lesq. et Jam.

b. Capsule small faintly striate; teeth smooth; pedicel short straight. Leaves small short.

3.**C.schisti** Wahlenberg. — Weisia Wng; Cynodontium Lindb.

Leaves denticulate gen. acute or short-acuminate, perichetial longer acuminate. Capsule round-oval symmetric; teeth us. not cleft. Habit of *Rhabdoweisia.* — Rocks in northern districts gen. r. *Eur.* Sweden less r., Norway! Finl.: Brotherus. *Amer.* Can.: Waghorne.

4.**C.alpestre** Wahlenberg. — Dicranum Wng; Cynodontium Lindb.

Leaves denticulate also below middle, very small gen. obtuse; perichetial short-acuminate. Capsule oval symmetric very small; teeth cleft. Tufts very low — Rocks in northern alps r. *Eur.* Norway! »Sweden»: Wahlenb. *Amer.* »Greenl.: Vahl»: Lange.

5.**C.strumulosum** C. M. et Kindb. cat. Can. m.

Leaves crenulate above, somewhat longer than in the last: lower gen. acute, upper obtuse; perichetial somewhat long-acuminate. Capsule oblique subobovate gen. strumose; annulus distinct; teeth cleft. Stem higher than in the last. — Limestone rocks r. *Amer.* Can. Rocky mts: Macoun.

B. Leaves faintly mamillose and subulate-acuminate; alar cells us. distinct; costa nearly smooth at back. Capsule us. annulate; teeth cleft.

a. Capsule strumose somewhat large.

6.**C. strumiferum** Ehrhart. — Dicranum E.; Cynodontium Notaris.

Leaves long denticulate above; perichetial with subulate acumen. Capsule suboblong oblique; teeth papillose reddish or orange; pedicel long. Tufts somewhat high. — On rocks r. on trees, princ. in northern districts. *Eur.* Sweden common, Norway, Switzerl.! »Engl. r.»: Braithwaite. *Amer.* Can.: Macoun; Waghorne.

b. Capsule not strumose gen. not large.

7.**C. polycarpum** Ehrhart. — Dicranum E.; Cynodontium Schimper.

Leaves more or less denticulate us. long. Capsule us. finally subcylindric and sulcate, less often oblique; teeth as in the last; pedicel us. not long and often thin. Tufts more or less radiculose. — Rocks not r. *Eur.* Sweden, Norway, Switzerl.! Finl.: Lindberg. *Amer.* Can.: Macoun; Drummond; Waghorne. Greenl.: Vanhoeffen.

* **C. torquescens** Bruch. — Dicranum Bruch; Cynodontium Limpricht; Oncophorus polycarpus *nigricans Kindb. Laubm. Schwed. u. Norw.

Leaves less long and often nearly smooth, gen. subobtuse and faintly denticulate. Capsule erect symmetric faintly striate, often small; annulus not revoluble. Tufts often low and blackish below. Habit of *C. Bruntoni.* — Rocks. *Eur.* not r. Sweden, Norway, Switzerl.! Austria: A. Schmidt.

* **C. fallax** Limpricht.

Leaves long acute denticulate also below middle, distinctly mamillose. Capsule erect symmetric faintly striate; annulus not revoluble. Tufts us. green and somewhat high. — Rocks. *Eur.* Norway! Sweden: E. Jæderholm. *Amer.* r. Can.: Waghorne.

8.**C. subalpestre** Kindb. cat. Canad. m.

Differs from *C. polycarpum*: Leaves smaller nearly pellucid, reflexed only at one border, gen. smooth and entire. Capsule small not distinctly annulate; pedicel scarcely 1 c. m. long. Stem eradiculose very short. — *Amer.* r. Can.: Drummond n. 103, com. Macoun.

II. Oreoweisia Schimper.

A. Leaves long gradually long-subulate, crisped when dry.

9.**C.Bruntoni** Smith. — Dicranum Sm.; Cynodontium Br. eur. Leaves recurved near base, distantly denticulate-sinuolate at acumen; basal cells hyaline not much wider than the others. Capsule suboblong pale brown; annulus persistent. Tufts yellowish green us. subpulvinate. Monoecious. — Rocks. *Eur.* not r. Sweden, Switzerl.! Corsica: Levier. France: Schimper.

10.**C.robustum** Venturi. — Dicranoweisia Vent. revue bryol. 1882; Cynodontium Kindb.

»Doubly or triply larger than the last. Differs in leaves smooth; capsule ovate; tufts 3—4 c. m. high or higher, fuscous below, yellowish above. — *Eur.* Portugal»: Venturi.

B. Leaves short broad: upper crisped, lower nearly spirally twisted about stem (as in *Anoectangium*) when dry.

11.**C.serrulatum** Funck. — Weisia Funck; Cynodontium Kindb. Leaves narrowly ovate-oblong or sublinear, short-acuminate subacute, not or (at one side) faintly recurved, strongly mamillose, in upper part densely mamillose-serrulate; upper cells small dusky, the basal pellucid rectangular; costa subpercurrent, serrulate at back. Capsule small suboval rostellate; pedicel short not much exserted above the tufts. Monoecious. — Rocks in alp. region r. *Eur.* Austria: Breidler. *Amer.* »U. S. and Alaska»: Lesq. et Jam.

12.**C.obtusatum** Kindb. — Oreoweisia Kindb. rev. bryol. 1896; O. serrulata var. tenuior C. M. et Kindb. cat. Can. m. Leaves obtuse broader and shorter than in the last, subovate not acuminate, strongly recurved below, very mamillose, densely mamillose-serrulate above; basal cells mostly short, gen. not pellucid; costa percurrent. Tufts very tomentose to the short green tops. Capsules and flowers unknown. Differs from the resembling *Dichodontium pellucidum *fagimontanum* in smaller and shorter not sheathing leaves, nearly spirally twisted about stem, not or (the uppermost) r. crisped. Resembles also *Anoectangium.* — Damp rocks r. *Amer.* Can: Macoun.

III. Pseudo-Philonotis Kindb.

13.**C.boreale** Hagen and Limpricht. — Philonotis fontana var. borealis Hagen; Ph. borealis Limpricht; Cynodontium Kindb. Leaves small subovate short-acuminate acute; cells subquadrate (or the basal short-rectangular) larger than in other species and more or less pellucid; costa percurrent serrulate at back. Lower leaves smooth pellucid nearly entire, sometimes decurrent. Upper leaves densely mamillose-serrulate nearly all around. Tufts high compact tomentose, green above. — Swamps in higher alp. region r. *Eur.* Norway in Galdhoe 1800 metr. a. s.: I. Hagen.

90. **Dichodontium** Schimper.

A. Leaves obtuse or subacute at apex: perichetial similar but more distinctly sheathing. Male plants in separate tufts; perigonial leaves with percurrent costa.

1.**D.pellucidum** L. — Bryum L.; Dichodontium Schimp.

Leaves channelled from suboblong base sublinear or sometimes ovate-oblong, undulate and scarcely reflexed, us. nearly crowded; inner basal cells narrow hyaline, the others quadrate; costa percurrent. Capsule oblique inclined; teeth purplish below, orange above; lid rostellate; pedicel long yellowish or pale red. Tufts dark or brown green. Dioecious. Leaves very variable in size. — Wet rocks not uncommon. *Eur.* Norway, Switzerl.! Engl.: Holt. *Amer.* Can.: J. Macoun; Moser; Waghorne. Alaska: J. M. Macoun.

* **D.fagimontanum** (Bridel as var.) Kindb. as subsp.

Leaves small subovate-oblong nearly entire: perichetial longer acuminate. Capsule smaller; pedicel short reddish. — Rocks r. *Eur.* Switzerl.! Engl.: Rogers; Cunliffe. *Amer.* Can.: Macoun; Drummond.

2.**D.flavescens** Dickson. — Bryum Dicks.; Dichodontium Lindb.

Differs from the last: Leaves longer and more serrate, less mamillose, distant. Capsule subsymmetric or symmetric, not or faintly inclined; teeth orange. Tufts not or sparingly radiculose, bright green or green. Very r. fruiting. — Wet often submerged rocks r. *Eur.* Norway fruiting, Germany! Sweden fruit.: P. Olsson. France fruit.: Lamy, com. Husnot. *Amer.* Can. fruit.: J. Macoun. Alaska: J. M. Macoun.

B. Leaves acute at apex; the perichetial much different. Male plants mixed with fertile; perigonial leaves with not percurrent costa.

3.**D.subflavescens** Kindb. in Hedwigia 1896 p. 59.

Leaves channelled from suboblong base tapering to an attenuate acumen, serrate often to below middle, long distant nearly smooth; cells and costa as in the last. Capsule symmetric erect; teeth dark purplish; pedicel long pale red. Perichetial leaves narrower than the others, long-acuminate and gen. subulate, in upper part of acumen nearly filled by the percurrent or excurrent costa. Perigonial leaves large long-acuminate.

Leaves of male plants sometimes obtuse. Tufts very tomentose to the green tops, often high. — Wet rocks r. *Amer.* Pacif. distr. Can.: Macoun. U. S.: Roell; Henderson, com. Cardot.

›*Dichodontium olympicum* Renauld et Cardot (ined.). Leaves very papillose, minutely denticulate nearly all around; capsule strumose. — U. S. Wash.: Henderson›: Cardot in Musci Amer. sept. — Specimens not seen.

91. **Dicranum** Hedwig.

A. Capsule straight (in *D. hyperboreum* faintly oblique) not strumose. Leaves not undulate; cells gen. not porose.

a. Monoecious. Leaves entire us. small. Pedicel of capsule not long. Stem gen. without rhizoids above base.

I. **Arctoa.** Leaves channelled; alar cells us. distinct; costa narrow more or less excurrent. Capsule not large; teeth often spreading when dry; pedicel short-emergent.

II. **Metzleria.** Leaves convolute above; alar cells not well-defined; costa very broad long-excurrent. Capsule small; teeth not spreading; pedicel exserted. Plants small.

b. Dioecious. Leaves sometimes denticulate us. large. Pedicel of capsule long. Stem radiculose also above base.

aa. Leaves with narrow or not very broad costa; alar cells persistent.

III. **Orthodicranum.** Leaves channelled or convolute above; upper cells subquadrate. Pedicel of capsule straight; peristomial teeth cleft. Tufts us. green.

bb. Leaves with very broad long-excurrent costa.

IV. **Paraleucobryum.** Leaves subconvolute above, persistent; alar cells persistent us. brown, the others few short-rectangular; costa thick formed by 3 layers as in *Leucobryum glaucum*, middle layer consisting by small green cells. Pedicel of capsule straight; teeth often partite. Tufts whitish green. Calyptra very long.

V. **Pseudo-Campylopus.** Leaves channelled persistent; alar cells persistent brown, the others numerous rectangular; costa not thick. Pedicel of capsule straight; teeth cleft. Tufts green or brownish.

VI. **Dicranodontium.** Leaves channelled soon deciduous; alar cells fugitive pale, the others numerous rectangular; costa not thick. Pedicel of capsule arcuate; teeth often partite. Tufts green or brownish.

B. Capsule curved or oblique sometimes strumose. Leaves often undulate when dry; cells often porose.

VII. **Eu-Dicranum.** Peristomial teeth cleft. Leaves with narrow or not much broad costa.

a. Monoecious. Stem gen. without rhizoids above base. Leaves not undulate. Capsule often strumose.

1. **Falcatiformia.** Leaves channelled not large, flexuous or falcate; costa us. long-excurrent. Capsule not large. Plants not robust.

2. **Molliformia.** Leaves large convolute above, nearly straight; costa not or slightly excurrent. Capsule large. Plants robust.

b. Dioecious. Stem us. tomentose. Leaves sometimes undulate. Capsule not strumose.

aa. Leaves carinate above.

3. **Carinatifolia.** Leaves gen. broad at base, often undulate; costa subpercurrent.

bb. Leaves channelled at least below, not carinate above.

4. **Scopariiformia.** Leaves not distinctly convolute above, broad at base, not long-subulate, sometimes undulate; costa r. excurrent.

5. **Fuscescentiformia.** Leaves not distinctly convolute, narrow gen. long-subulate, not undulate; costa often excurrent.

6. **Convolutifolia.** Leaves convolute above, not undulate, broad or narrow; costa not r. excurrent.

I. Arctoa Bruch et Schimper.

1.**D. fulvellum** Dickson. — Bryum Dicks.; Dicranum Smith.

Leaves us. flexuous or falcate, sometimes nearly straight; alar cells not well-defined, the others gen. long; costa often denticulate above. Capsule small straight strangulate not or faintly striate; teeth spreading when dry. Tufts us. yellowish. — Rocks in alp. region r. *Eur.* Norway! Spetsbergen: Berggren. Sweden, in Lapland (a var. with green shorter leaves and less emergent capsule: »*D. Anderssonii*» Wichura): E. Nyman. *Amer.* U. S.: Roell.

2.**D. hyperboreum** Gunner.

Leaves flexuous or nearly straight, larger than in the last: alar cells well-defined; uppermost cells short; costa not or indistinctly denticulate. Capsule somewhat oblique sulcate wide-mouthed not constricted, larger than in the last; teeth erect. Tufts blackish or brown when dry. — Fissures of rocks in northern alp. regions r. *Eur.* Norway! »Sweden»: Lindberg. *Amer.* Greenl.: Berggren.

II. Metzleria Schimper, as genus.

3.**D. alpinum** Schimper. — Metzleria Sch.; Dicranum Kindb.

Leaves narrowly ovate-oblong somewhat flexuous; cells rectangular: outer basal narrower; costa smooth. Capsule oblong-oval not sulcate; calyptra long. Tufts pale brown. Resembling a small *D. albicans* or a *Dicranella.* — Rocks in alp. region

r. *Eur.* Austria: Breidler, com. Warnstorf. Norway: Kaalaas, com. E. Nyman.

III. Orthodicranum C. Mueller.

A. Leaves brittle and channelled.

a. Leaves not subulate-acuminate; costa long-excurrent.

4.**D.fulvum** Hooker.

Leaves denticulate above, crisped when dry; cells gen. short; costa somewhat broad Capsule striate. Tufts us. brown-yellow. R. fruiting. — Rocks princ. of sandstone in woods in lower regions. *Eur.* princ. in southern distr. not r. Switzerl.! France: Husnot. Sweden: Berggren. Norway: E. Nyman. *Amer.* not r. Can.: Macoun.

5.**D.viride** Sullivant et Lesquereux. — Campylopus Sull. et Lesq.; Dicranum Bruch et Sch.; D. subfulvum Ren. et Card. ?

Leaves entire or r. near apex denticulate, us. not crisped or sometimes nearly straight; cells short or the lowest long; costa gen. less broad. Tufts us. green. Very r. fruiting. »Capsule not striate»: Schimper. — Us. on trees r. on rocks. *Eur.* r. Switzerl.! France: Husnot. Sweden: P. Larsson. Norway: Bryhn. *Amer.* Can. eastern districts: Macoun; Moser.

6.**D.strictum** Schleicher.

Leaves entire nearly straight; lower (inner) cells long, the uppermost short-rectangular; costa narrow. Capsule not striate. Tufts pale or yellowish green. R. fruit. in Europe. — Trees or decayed trunks. *Eur.* r. Sweden 1852! Austria: Breidler, com. Warnstorf. *Amer.* less r. princ. in Pacif. distr. Can.: J. Macoun (fruit.). Alaska: J. M. Macoun.

b. Leaves long-subulate; costa short-excurrent or percurrent.

7.**D.subulifolium** Kindb. bull. Torr. club XVII.

Leaves entire, flexuous when dry; cells as in the last; costa narrow. Tufts pale green. — Logs in woods r. *Amer.* Can. Vanc. isl.: Macoun.

B. Leaves gen. not brittle, us. crisped when dry; lower cells gen. long; costa narrow.

a. Leaves short-subulate, denticulate to below middle, rough at back, channelled.

8.**D.montanum** Hedwig.

Leaves with not excurrent costa. Tufts very dense us. green often low. — Decayed trunks. *Eur.* common. Sweden, Norway, Switzerl.! *Amer.* r. Can.: Macoun; Waghorne.

b. Leaves long-subulate, nearly entire, not rough at back, us. convolute above.

9.**D.flagellare** Hedwig.

Costa of leaves denticulate at back, not excurrent. Stem often with flagellæ (short brittle branchlets). Tufts us. pale brown sometimes green. — Decayed trunks not r. *Eur.* Norway! Sweden: S. O. Lindberg; R. Hartman; S. Hardin. *Amer.* Can.: Drummond; Macoun; Dearness. U. S.: Roell; Green.

10.**D.Scottii** Turner.

Costa of leaves smooth excurrent. Stem not flagelliferous. Tufts us. brown often high. — Rocks princ. near Atlantic sea r. *Eur.* France: Le Jolis. Scotl.: Cash. Irel.: Holt. Denmark: Jensen.

c. Leaves acute or short-subulate nearly entire, not rough at back. Capsules unknown.

11.**D.miquelonense** Renauld et Cardot.

Leaves short often subconvolute above, appressed when dry, the uppermost gen. obtusate; nearly all cells short; costa narrow, gen. not excurrent. Stem 2—3 c. m. high. — Rocks r. *Amer.* Miquelon isl.: Delamare, com. Cardot.

12.**D.crispatulum** (Roell as var., in Hedwigia 1897 p. 42) Kindberg n. sp.

Differs from the last: Leaves not or slightly involute above, crisped or flexuous when dry; lower cells short-rectangular or longer. Stem about 1 c. m. high. — *Amer.* r. U. S. New Jersey: J. Roell.

IV. Paraleucobryum Lindberg.

13.**D.albicans** Br. eur. — D. enerve Thedenius (older name); Campylopus Hallii Lesq. and C. frigidus Lesq. ?

Leaves ovate-oblong acute not much shorter than the excurrent part of costa, entire or r. faintly denticulate near apex, straight and appressed or sometimes falcate, rigid but not brittle; alar cells dilated brown nearly reaching to costa. Capsule smooth erect not large. Stem tomentose, high when sterile, low when fruiting; such specimens are resembling *D. alpinum* or a small *Campylopus*. Very r. fruit. — Alp. rocks r. Switzerl. fruiting! Norway! *Amer.* Can. Brit. Col. fruit.: Macoun.

V. Pseudo-Campylopus Kindb.

A. Lamina of leaves not or scarcely shorter than the excurrent part of costa; alar cells not reaching to costa. Leaves gen. not rigid; costa gen. not occupying more than the half of lamina at base.

14.**D.longifolium** Ehrhart.

Leaves soft nearly entire or faintly denticulate, gradually acuminate; excurrent part of costa more or less serrulate. Perichetial leaves subconvolute abruptly apiculate. Capsule somewhat large; pedicel us. long. Tufts sparingly radiculose us. green or brown-green. Not r. fruiting. — Rocks and stumps. *Eur.* common. Sweden etc.! *Amer.* not common. Can.: Macoun; Drummond.

* **D.Sauteri** Schimper.

Leaves gen. entire; costa occupying about $^1/_3$ of leaf-base, nearly entire; inner basal cells more numerous. Perichetial leaves long-subulate. Tufts dense not sparingly radiculose. — Rocks r. *Eur.* Norway, Switzerl.! Austria: C. E. Kindberg.

* **D.pachytrichum** Kindb. cat. Can. m. (as var.).

Leaves entire brittle; costa occupying about $^1/_4$ of leaf-base, faintly serrulate above; inner basal cells numerous. Perichetial leaves exserted convolute short-acuminate. Pedicel of capsule about 1 centim. long. Tufts brown when dry; stem wholly tomentose. — Alp. rocks r. *Amer.* Brit. Col. Selkirk mts 1300 metr. a. sea: Macoun.

B. Lamina of leaves much shorter than the excurrent part of costa; alar cells reaching to it. Leaves rigid; costa very broad at base. Tufts us. tomentose.

15.**D.pachyneuron** Molendo. — Campylopus M.; Dicranum Kindb.

Leaves falcate not brittle; awn subulate serrulate. Capsules unknown. Tufts compact very tomentose. — Alp. rocks r. *Eur.* Switzerl.!

16.**D.serratum** Kindb. (in litt. ad Limpricht 1887).

Leaves brittle more or less curved; awn strongly serrate, its upper part sublinear. Capsule as in *D. longifolium.* Tufts more or less radiculose us. green. — Rocks r. *Eur.* Norway Dovrefjeld etc.! Sweden Dalsland near Rostock!; Uddewalla: P. Larsson. Germany: Roell.

VI. Dicranodontium Bruch et Schimper.

17.**D.longirostre** Weber et Mohr. — Didymodon W. M.; Dicranum Kindb.; Didymodon denudatus Lindb.; Dicranodontium virginicum Britton.

Stem not brittle. Leaves brittle at base and easily deciduous, gradually tapering to a long-subulate in upper part faintly serrulate acumen, flexuous or falcate; lower cells (above the alar) gradually narrower from costa to border. Tufts us. yellowish or green. Not r. fruiting. — Rocks, earth and decayed trunks. *Eur.* not r. Spain, Switzerl., Sweden! Norway: R. Hartman. Austria: Breidler. *Amer.* r. Can.: Moser.

18.**D.asperulum** Mitten. — D. virginicum Austin; Dicranodontium aristatum Schimper; D. Millspaughi Britton.

Leaves and stem brittle. Leaves narrower than in the last, less gradually tapering to the also in lower part serrulate acumen, less flexuous or nearly straight when dry; lower cells (above the alar) dilated nearly uniform. Tufts us. pale brown, very soft and silky-like. Very r. fruiting. — Rocks r. *Eur.* Austria: A. Schmidt. Norway: Wulfsberg, com. P. Olsson. *Amer.* U. S.: com. Cardot.

VII. Eu-Dicranum.

1. Falcatiformia.

A. Capsule sulcate when dry.

19.**D.Starkei** Weber et Mohr. — Oncophorus suecicus Arnell et Jensen.

Leaves flexuous; alar cells well-defined; uppermost cells short, the others long or short. Capsule sometimes suberect and less distinctly strumose. Perichetial leaves subovate us. long-aristate. Tufts us. green. — Rocks princ. in alps not r. *Eur.* Norway, Spain, Switzerl.! Sweden: R. Hartman; Arnell. France: Boulay, com. Husnot. *Amer.* Can.: Macoun. U. S.: Roell.

B. Capsule not sulcate.

a. Leaves distinctly falcate also when dry.

20.**D.falcatum** Hedwig.

Alar leaf-cells not well-defined; other cells gen. long, the uppermost short-rectangular. Perichetial leaves subovate often long aristate. Tufts often blackish. — Alp. rocks r. *Eur.* Norway, Switzerl.! France: Husnot. Scotl.: Rogers. *Amer.* »U. S.»: Lesq. et Jam.

b. Leaves flexuous not falcate.

21 **D.schisti** Gunner. — Bryum Gunn.; Dicranum Lindberg; D. Blyttii Schimper.

Leaves entire; alar leaf-cells well-defined, the others short at least the uppermost. Capsule distinctly necked or strumose. Perichetial leaves oblong short-aristate. Tufts us. blackish below. — Rocks princ. in alps and northern districts. *Eur.* not r. Sweden (also below alps), Norway! Scotl.: Rogers. Spetsbergen: Berggren. Portugal: Levier. *Amer.* r. Can.: Macoun. Greenl.: Berggren.

22.**D.pumilum** Sauter. — Aongstroemia Sauteri C. M.

Leaves sometimes slightly denticulate; cells gen. short, the alar not much distinct; costa sometimes percurrent. Pedicel of the indistinctly necked capsule short. Perichetial leaves long-aristate. Tufts blackish about 0,5 c. m. high or lower. Much smaller than the last. — *Eur.* »Austria: Sauter»: C. M. *Amer.* Can. Labrador: Waghorne. U. S.: Roell.

2. Molliformia.

23. **D. molle** Wilson. — D. arcticum Schimper.

Leaf-cells long except the well-defined alar. Capsule not sulcate; pedicel often long. Perichetial leaves long-aristate. Tufts dark or yellowish brown. Habit of *D. spadiceum.* R. fruiting. — Wet earth often near rivulets, in higher northern alp. region, r. *Eur.* Norway! Sweden: C. Indebetou. Scotl.: T. Rogers. Spetsbergen: Berggren, com. A. G. Nathorst. *Amer.* Alaska: Palmer; J. M. Macoun. Greenl.: Berggren.

3. Carinatifolia.

A. Costa of leaves strongly serrate at back. Upper leaf-cells often long.

a. Capsules sulcate us. clustered 3—4 together. Leaves decurrent more or less distinctly undulate when dry.

24. **D. undulatum** Ehrhart.

Leaves very distinctly undulate also when moist, strongly serrate above middle, recurved at one side near base, us. long-subulate, often nearly straight and spreading when dry; angular cells diversiform, the alar brown dilated; other cells long and porose; costa with serrate ridges at back. Inner perichetial leaves nerveless. Tufts green. — On ground in woods. *Eur.* gen. common (in Great Britain r.). Sweden, Switzerl.! *Amer.* common. Can.: Macoun.

* **D. ontariense** Kindb. n. subsp.

Leaves less spreading, not recurved, strongly serrate only in upper part of acumen. Capsule solitary. — *Amer.* Can. r.: Macoun.

25. **D. Drummondii** C. Mueller.

Leaves tapering to a long sublinear in upper part serrate acumen, not recurved, flexuous or crisped when dry, often indistinctly undulate; cells very chlorophyllose not porose: lower angular yellow, alar uniform dilated us. hyaline, other lower basal long, the others short irregular but the apical often long. Tufts green or yellowish. — Damp woods and peat-bogs. *Amer.* not r. Can.: Macoun; Roell.

b. Capsules solitary r. in pairs. Leaves not decurrent r. undulate.

26. **D. canadense** Kindb. bull. Torr. club XVII.

Leaves narrowed to a long subulate in upper half strongly serrate acumen, us. nearly straight, often brittle, sometimes convolute below; alar cells dilated yellow, inner basal hyaline narrower, other cells long. Perichetial leaves acuminate costate long-aristate. Capsule sulcate us. solitary. Tufts dark green. — Earth in woods. *Amer.* r. Can.: Macoun; Waghorne. U. S.: Roell.

27. **D. consobrinum** Renauld et Cardot.

Differs from the last: Leaves shorter, perichetial short-aristate often emarginate; capsules smooth often in pairs. — *Amer.* r. U. S.: Henry, com. Cardot.

28. **D. scopariiforme** Kindb bull. Torr. club XVI.

Leaves broadly acuminate or short-subulate, strongly serrate in upper part of acumen, not brittle, often curved r. undulate; alar cells brown dilated, the others gen. oblong-oval or narrower, r. porose; costa with serrate ridges at back. Inner perichetial leaves nerveless, emarginate or crenulate above. Capsule smooth. Tufts green. — *Amer.* r. Can. Rocky mts: Macoun. U. S. Michigan: Purpus, com. Roell.

29. **D. camptophyllum** Kindb. n. sp.

Leaves tapering to a long subulate in upper half strongly serrate acumen, falcate and not crisped when dry; cells not porose: those of acumen subquadrate, the alar yellow dilated subrectangular reaching to costa; other basal cells long. Perichetial leaves obtusate or abruptly tapering to a gen. longer, narrow-subulate or subfiliform awn with long-excurrent costa. Capsule solitary not sulcate. Tufts green above. — *Amer.* r. Can. Northern Labrador: Macoun 1896.

B. Costa of leaves faintly rough at back. Upper leaf-cells gen. short. Capsule solitary sulcate.

a. Leaves not brittle, gen. broad at base; angular cells diversiform: alar dilated brown persistent, inner basal narrow. Capsule long-pedicellate.

30. **D. Bergeri** Blandow. — D. Schraderi Weber et Mohr.

Leaves us. tapering to a long broadly sublinear in upper part serrulate often obtuse acumen, often undulate and flexuous; upper cells short; costa not percurrent. Perichetial leaves often emarginate and short-aristate. Tufts us. brown-green. — Peat-bogs and swamps gen. common. *Eur.* Sweden, Norway! *Amer.* Can.: Macoun. Greenl.: Vanhoeffen.

* **D. rupincola** Kindb. n. subsp.

Leaves subulate-acuminate; costa percurrent, serrulate at back.

Perichetial leaves long-aristate not emarginate. — Rocks r. *Amer.* Can. Rocky mts: Macoun.

* **D.rigidum** Kindb. Laubm. Schwed. u. Norw.

Leaves acute short-acuminate rigid not undulate, nearly appressed when dry; costa subpercurrent. Tufts nearly eradiculose, pale or whitish green when dry. Capsules unknown. — In bogs r. *Eur.* Sweden near Strœmstad: P. Olsson.

31.**D.pallidum** Bruch et Schimper. — D. sabuletorum Renauld et Cardot.

Differs from *D. Bergeri:* Leaves gradually acuminate acute short-subulate, often crisped when dry; cells sometimes suboblong; costa percurrent or subexcurrent. — Sandy soil r. *Amer.* Can.: Waghorne. U. S.: Sull. et Lesq. exsicc., com. Cardot; Sawyer and Green, com. Cardot.

b. Leaves brittle and narrow; angular cells uniform dilated fugitive faintly yellowish; other basal cells long hyaline. Capsule short-pedicellate.

32.**D.leucobasis** C. M. et Kindb. l. c.

Leaves tapering to a very long narrow nearly wholly spinulose-serrulate acute acumen, faintly undulate and crisped when dry; middle cells of lamina gen. short. Capsule not large. Resembles somewhat *D. fuscescens* in habit. — Base of trees in woods r. *Amer.* Pacif. distr. Can. Brit. Col.: Macoun. U. S.: Roell.

4. Scopariiformia.

A. Leaves rough or denticulate at back of lamina, us. crisped and often undulate when dry; costa sometimes excurrent.

33.**D.elatum** Lindberg. — D. robustum Blytt (the inventor).

Leaves long, tapering to a long spinulose-serrulate brittle acumen, dentate at back; acumen with narrow-subulate often circinnate point; cells of angles diversiform, the inner narrow; other cells of lower part long, the upper short irregular; costa very rough at back near apex, often excurrent. Capsules clustered 3—4 not striate when wholly ripe. Plants yellowish green very robust us. high. — Bogs and humid woods r. *Eur.* Norway! Sweden!; Lindberg.

34.**D.spurium** Hedwig.

Leaves gen. not long, ovate-lanceolate acute or from subovate base abruptly acuminate, subpapillose at back, very faintly serrate at the us. short acumen; cells as in the last; costa abbreviate or subpercurrent, faintly rough at back. Capsule solitary striate. Tufts yellowish green not high. — Dry heaths and woods on sandy soil, r. on rocks. *Eur.* not r., common in northern distr. Sweden, Norway, Switzerl.! *Amer.* Can. not r.: Macoun; Waghorne.

B. Leaves smooth at back of lamina, not crisped; costa not excurrent.

a. Leaves not undulate gen. short.

35.**D.brachycaulon** Kindb. cat. Can. m. — D. plano-alare C. M. et Kindb. l. c.

Leaves ovate-oblong or broadly ovate-lanceolate acute, entire or near apex indistinctly denticulate, sometimes nearly appressed when dry, smaller than in the last; cells gen. short also near base; costa smooth at back. Tufts low green. — Dry rocks or earth r. *Amer.* Can.: Macoun; Waghorne.

36.**D.stenodictyon** Kindb. bull. Torr. club XVI. — Monocranum Kindb. cat. Canad. m.

Leaves narrowed below, from oblong base short-acuminate obtuse, very short, crenulate (not serrate) above middle, appressed when dry; cells thick-walled not porose; the outer alar brown, the inner hyaline; other cells lanceolate or the upper oblong, the apical sometimes oval; costa very narrow, serrulate above at back. Capsules unknown. Tufts blackish when dry with straw-yellow tops, nearly eradiculose. Habit of *Calliergon sarmentosum*. — Earth in woods r. *Amer.* Can. Brit. Col.: Macoun. — In the resembling *Monocranum dicranoides* C. M. (from Chile, com. C. M.) leaves are long-acuminate, peristomial teeth entire, not cleft.

b. Leaves long gen. broadly acuminate or short-subulate, sometimes undulate.

aa. Leaves distinctly decurrent; cells not porose, those of decurrent part narrow; costa smooth at back. Tufts nearly without rhizoids. Capsules unknown.

37.**D.leioneuron** Kindb. bull. Torr. club XVI.

Leaves gen. quite entire, sometimes subobtuse at apex, convolute in middle, suberect when dry, not undulate; angular cells diversiform, the inner pellucid sometimes pale yellow; other cells long narrow; costa very narrow. Tufts yellowish. — Swampy woods r. *Amer.* Can. Anticosti: Macoun.

bb. Leaves gen. not distinctly decurrent; cells us. porose; costa more or less denticulate at back. Inner perichetial leaves longer than the awn. Pedicels long solitary or r. in pairs. Tufts radiculose.

38.**D.scoparium** L. — Bryum L.; Dicranum Hedwig.

Leaves faintly serrulate in upper part of acumen, more or less curved and patent but not spreading when dry, r. undulate; angular cells diversiform, the alar brown more dilated, the inner pale yellow or less often hyaline; other cells gen. long, the uppermost sometimes suboblong; costa us. with 2 serrate ridges at back near apex. Perichetial leaves not long-aristate. Capsule not sulcate. Tufts us. green, sometimes blackish. — Dry places common, less often in bogs and somewhat r. in alp. regions *Eur.* Sweden, Norway, Switzerl.! *Amer.* Alaska: J. M. Macoun. Can.: J. Macoun; Waghorne. U. S.: Sullivant, com. C. Mueller; Roell.

* **D. involutum** Kindb. n. subsp.

Leaves falcate not or sparingly porose, very concave, subconvolute in middle, very chlorophyllose, sometimes undulate; cells gen. oblong-oval. Capsules unknown. — *Amer.* r. Can. Vanc. isl.: Macoun. U. S.: Roell.

39. **D. Bonjeani** Notaris. — D. palustre Br. eur.

Leaves nearly entire, spreading and undulate when dry, often nearly straight; cells as in *D. scoparium*; costa nearly smooth without ridges at back, us. not percurrent. Perichetial leaves short-aristate. Capsule sulcate. Tufts us. yellowish. — Bogs. *Eur.* not common. Sweden (common), Norway! *Amer.* r Can.: Macoun.

40. **D. undulifolium** C. M. et Kindb. l. c.

Leaves nearly entire, often obtuse at apex, nearly appressed and slightly undulate when dry; cells as in the last; costa not lamellate but denticulate at back near apex. Tufts golden glossy, sparingly radiculose. Capsules unknown. — In alps r. *Amer.* Can. Rocky mts 2500 metr. a. s.: Macoun; Vanc. isl.: Roell. U. S.: Roell.

41. **D. angustum** Lindberg; Kindb. rev. bryol. 1896.

Leaves entire not undulate, narrower and less spreading than in *D. Bonjeani*, often nearly straight and suberect; cells as in the same species but gen. not porose; costa percurrent, nearly smooth without ridges at back. Capsule sulcate. Tufts yellowish green. — Bogs r. *Eur.* northern districts. Norway! Finl.: Brotherus. Sweden princ. in Lapland: E. Nyman.

42. **D. Roellii** Kindb. in Hedwigia 1896 p. 60. — D. Bonjeani var. Roellii Barnes.

Differs from *D. Bonjeani* in leaves neither spreading nor undulate and their costa sometimes bilamellate. — More allied to *D. scoparium;* differs from it in leaves faintly crenulate at acumen, their upper cells suboblong, less porose; costa more abbreviate, nearly smooth at back. — *Amer.* Pacif. distr. r. Can. Vanc. isl.: J. Roell.

Var. *Schlotthaueri* Barnes.

Leaves shorter, broader-acuminate, their upper cells gen. suboval, costa not bilamellate. Habit of *D. brachycaulon.* — *Amer.* r. U. S Yellowstone Park 2100 metr. a. s.: Roell.

43.**D.subpalustre** C. M. et Kindb. l. c.

Leaves serrulate in the greater part of the somewhat long narrow (sometimes brittle) acumen, very concave below, subconvolute at base of acumen, sometimes short-decurrent, not spreading, sometimes undulate when dry; cells as in *D. scoparium*; costa percurrent, serrulate in upper part but not lamellate. Perichetial leaves long-aristate. Capsule nearly smooth or finally sulcate. Tufts often yellowish. — Bogs r. *Amer.* Can.: J. and J. M. Macoun. U. S.: Roell. *Eur.* Sweden in Lapland: E. Nyman.

44.**D.hyalinum** Kindb. in Hedwigia 1896, p. 61.

Leaves faintly denticulate near apex, narrower and somewhat long-acuminate; alar cells nearly hyaline rectangular not well-defined; other cells hyaline not porose, narrow-linear except the oval apical; costa faintly denticulate near apex, narrow above but very dilated at base, not excurrent. Tufts loose very sparingly radiculose. Capsules unknown. — Alp. region r. *Amer.* U. S. Nat. Park 2100 metr. a. s.: Roell.

5. Fuscescentiformia.

A. Inner perichetial leaves longer than the awn.

a. Leaves very long and not crisped but falcate or nearly straight when dry, sometimes brittle; costa very narrow. Capsule large; pedicel very long. Tufts shining very high.

45.**D.majus** Smith.

Leaves with subulate nearly wholly serrulate acumen; angular cells diversiform, the inner hyaline; other cells long uniform porose; costa excurrent rough at least in upper half. Capsules faintly striate us. clustered. Inner perichetial leaves denticulate, truncate below the awn. Tufts green or yellowish. — On earth and shaded rocks in woods. *Eur.* not r. Sweden common! *Amer.* r. Can. eastern districts: J. Macoun. U. S.: Roell. Alaska: J. M. Macoun.

46.**D.Howellii** Renauld et Cardot bot. gaz. 1889. — D. angustifolium Kindb. bull. Torr. club XVII, 1890 (in part).

Leaves with sublinear in upper half serrulate acumen, narrower than in the last; cells as in the last; costa not distinctly excurrent and nearly smooth. Capsule sulcate solitary. Inner perichetial entire, attenuate to awn. Tufts us. golden glossy. — Damp rocks. *Amer.* Pacif. dist. not r. Alaska: J. M. Macoun. Can.: J. Macoun; Dawson. U. S. Oregon: Hertzman; Roell; Howell, com. Cardot.

* **D.angustifolium** Kindb. l. c. in part.

Capsule not sulcate. Leaves nearly entire. — Damp rocks r. *Amer.* Can. Vanc. isl.: Macoun.

b. Leaves less long and not brittle, us. flexuous or crisped when dry; costa sometimes somewhat broad. Capsule solitary gen. less large; pedicel not much long. Tufts us. low and not shining.

47.**D.fuscescens** Turner.

Leaves with subulate in upper part more or less serrulate acumen, flexuous or crisped; cells us. not porose; angular cells diversiform, the inner hyaline; other cells of base long, the upper gen. short; costa faintly rough at back, us. excurrent and somewhat broad. Capsule us. oblique striate or sulcate. Tufts us. grayish green when dry. — Decayed trunks or damp rocks in woods not r. *Eur.* Sweden, Norway! *Amer.* Can.: Macoun. U. S.: Roell.

* **D.congestum** Bridel.

Leaves less serrulate with sublinear acumen; cells us. porose; costa us. subpercurrent narrower. Capsule less striate. Tufts us. green. — Not r. *Eur.* Sweden, Norway, Switzerl.! Finl.: Brotherus. *Amer.* Can.; Macoun; Waghorne. U. S.: Roell.

* **D.Sendtneri** Limpricht.

Leaves nearly entire less flexuous, sometimes subconvolute; cells porose, upper gen. narrow. Capsule nearly straight. — Rocks r. *Eur.* Norway! Russia: Zickendrath.

* **D.subbrevifolium** Kindb. n. subsp.

Leaves larger, subconvolute nearly entire; costa not excurrent. Capsule sulcate. Stem somewhat high. Habit of *D. brevifolium*. *Amer.* r. Can. Rocky mts: Macoun.

48.**D.congestiforme** C. M. et Kindb. l. c.

Leaves with somewhat broad short-subulate nearly wholly serrulate acumen, faintly flexuous, larger than in *D. fuscescens*; upper and middle cells porose gen. narrow, the others as in the mentionned species; costa distinctly rough at back, not excurrent, narrow. Capsule oblique somewhat large and finally sulcate. Tufts greenish and high. — Damp subalp. rocks r. *Amer.* Can. Brit. Col.: Macoun.

49.**D.algidum** Kindb. revue bryol. 1896.

Leaves entire nearly straight and suberect, only the upper flexuous, narrower than in *D. fuscescens;* angular cells nearly uniform dilated; other cells very porose, gen. long; costa very narrow, nearly smooth at back or slightly rough in the excurrent part. Tufts soft and silky, green or dark green, nearly eradiculose. Capsules unknown. Habit of *D. spadiceum*; differs from it princ. in not convolute leaves. — Rocks in alps r. *Amer.* Can. Rocky mts 2700 metr. a. s.: Macoun. *Eur.* Sweden in Lapland, and Norway: E. Nyman.

* **D.subspadiceum** Kindb. n. subsp.

Leaves straight erect subconvolute, denticulate near apex and at the excurrent part of costa. Tufts brown with yellowish branch-tops. Capsules unknown. — Rocks in alp. region r. *Amer.* Can. Rocky mts 2500 metr. a. s.: Macoun.

B. Perichetial leaves shorter than the awn.

50.**D.sulcatum** Kindb. bull. Torr. club XVII; D. trachyphyllum Ren. et Card.

Leaves brittle not large, more or less flexuous when dry; cells porose, the uppermost short, the lower long; costa broader than in *D. fuscescens*, sometimes excurrent. Capsule sulcate. Habit of *D. fuscescens.* — Logs and rocks r. *Amer.* Can. Brit. Col.: J. and J. M. Macoun. N. Foundl.: Waghorne.

51.**D.crispulum** C. M. et Kindb. cat. Canad. m.

Differs from the last: Leaves narrower, more crisped when dry; cells not porose, the uppermost irregular sometimes suboblong; costa very narrow gen. percurrent. — On earth or trees in woods r. *Amer.* Pacif. distr. Can. Brit. Col.: J. Macoun. Alaska: J. M. Macoun. U. S.: Roell.

52.**D.perichætiale** Kindb. in Hedwigia 1896 p. 61.

Differs from the both last in the leaves larger and broader, neither crisped nor flexuous, only the uppermost subfalcate, less often brittle; cells larger, narrow-linear, not or sparingly porose; costa distinctly denticulate at back, not excurrent, narrower than in *D. sulcatum*; capsule larger. Resembles *D. scoparium* and *D. majus* in habit. — *Amer.* Pacif. distr. r. U. S.: Roell.

6. Convolutifolia.

A. Leaves serrulate in upper part of acumen.

a. Leaves long-subulate; costa somewhat long-excurrent. Tufts tomentose; tomentum often reddish.

53.**D.Muehlenbeckii** Bryol. eur.

Leaves flexuous; cells gen. not porose, the angular dilated nearly uniform, the inner pale yellow; other cells of lower part gen. narrow, the middle and upper short mixed with some long near apex; costa faintly rough at back. Capsule often nearly smooth. Often more robust and high than in the resembling *D. fuscescens*. — Rocks princ. in alp. or northern districts, not common. *Eur.* Norway, Switzerl.! France: Husnot. Germany: Kolb, com. Warnstorf. *Amer.* Can.: Macoun. U. S.: Roell.

b. Leaves not long-subulate; costa gen. percurrent. Tufts sparingly radiculose.

54.**D.rhabdocarpum** Sullivant.

Leaves patent-erect not flexuous; angular cells diversiform, the alar pale yellow; other cells gen. long; costa rough at back without ridges. Capsule sulcate. Habit of *D. scoparium*. — Subalp. woods r. *Amer.* Rocky mts: Lesq. et Sulliv. exsicc., com. Renauld. *Eur.* Sweden in Lapland: E. Nyman.

55.**D.dipteroneuron** C. Mueller in Flora 1887.

Leaves flexuous somewhat small; alar cells brown, the others narrow or the uppermost oval; costa with 2 serrulate ridges at back, sometimes short-excurrent. Capsule smooth not large; pedicel short. Habit of *D. brevifolium*. — *Amer.* r. Greenl.: C. Wensk, com. Roell. U. S.: Roell. »Alaska: Krause»: C. M.

B. Leaves gen. entire, r. indistinctly denticulate near apex. Capsule sulcate.

a. Leaves somewhat large; costa gen. percurrent. Tufts not densely radiculose. R. fruiting.

56.**D.brevifolium** Lindberg.

Leaves flexuous short-subulate, sometimes less distinctly convolute; angular cells dilated nearly uniform, outer brown, inner pale yellow; other cells gen. short; costa nearly smooth at back. Sometimes more robust and high than in the resembling *D. fuscescens*. — Rocks princ. in alp. or northern districts, r. *Eur.* Sweden, Norway! Finl.: Brotherus. *Amer.* Can.: Macoun.

57.**D.spadiceum** Zetterstedt. — D. neglectum Juratzka.

Leaves open-erect not flexuous, somewhat long-subulate; angular cells diversiform, the inner hyaline sometimes reaching to costa; other cells gen. long nearly uniform; costa smooth sometimes short-excurrent. Tufts often brown. Habit of *D. molle* and *D. scoparium*. — Rocks in alp. regions r. *Eur.* Norway, Switzerl.! France: J. E. Zetterstedt. Spetsbergen: Berggren. *Amer.* Greenl.: Berggren.

b. Leaves small; costa excurrent smooth at back. Tufts dense tomentose. Capsule not large.

58.**D.elongatum** Schleicher.

Leaves us. from somewhat broad base short-subulate and entire, nearly all appressed when dry; angular cells diversiform, the alar brown; other cells narrow except the gen. short upper; costa somewhat broad and not long-excurrent. Capsule faintly curved. Tufts green or brownish us. very high. — Swamps and wet rocks princ. in alps. *Eur.* nearly common in northern alps. Sweden, Norway! *Amer.* Can.: Drummond; Macoun; Waghorne. Greenl.: Wensk, com. Roell.

* **D.dovrense** Kindb. n. subsp.

Leaves narrower with longer subula, entire and not brittle, nearly all appressed when dry; nearly all cells narrow except the alar; costa longer-excurrent. Capsule faintly curved. — *Eur.* Norway in Dovrefjeld!

* **D.subfragilifolium** Kindb. n. subsp.

Leaves narrow long-subulate faintly denticulate above, flexuous, sometimes brittle; costa long-excurrent narrower. Capsule arcuate. — Northern alps r. *Eur.* Norway near Kongswold! *Amer.* Can.: Waghorne.

* **D.attenuatum** Kindb. n. subsp.

Leaves larger, gradually tapering to a somewhat long subula, nearly entire and often brittle, the uppermost flexuous; costa short-excurrent. Capsule more or less curved. Habit of *D. fragilifolium.* Tufts low. — *Amer.* Can. Labrador: Waghorne.

59.**D.fragilifolium** Lindberg. — D. Macounii Austin in herb. Macoun.

Leaves from narrow base very long-subulate, entire and brittle, gen. straight erect or the uppermost flexuous; alar cells r. well-defined, the others gen. rectangular or some few short; costa narrow very long-excurrent. Capsule oblique us. arcuate, larger than in *D. elongatum.* Tufts low us. green or pale brown. Habit of *D. strictum.* — On logs in northern princ. subalp. districts r. *Eur.* Norway! Sweden: S. O. Lindberg; E. Nyman. *Amer.* Can.: Drummond; Macoun; Waghorne.

c. Leaves small entire; costa percurrent smooth at back. Tufts densely radiculose. Capsule small. Habit of *D. elongatum.*

60.**D.groenlandicum** Bridel. — D. labradoricum C. M.; D. tenuinerve **Zetterstedt.**

Leaves abruptly narrowed to the scarcely longer acumen, gen. broader than in *D. elongatum*, strongly appressed when dry; angular cells us. not well-defined, other cells gen. long or the uppermost shorter; costa very narrow. Capsule curved. Tufts high pale brown very compact. R. fruiting. — Swamps and wet rocks in arctic or other northern alps r. *Eur.* Norway! Spetsbergen: Berggren; R. Gyllencreutz. Russia near Kola: Brotherus, com. C. Mueller. *Amer.* U. S. Miquelon isl.: Delamare, com. Cardot.

61.**D.Sphagni** Wahlenberg fl. lappon.

Leaves as in the last but somewhat larger, more gradually narrowed, looser appressed or subflexuous; cells as in the last but the angular more distinct and brown; costa less narrow. Capsule straight or slightly curved. Tufts somewhat low, not very compact, often green. — Swamps r. *Eur.* Norway! *Amer.* Can.: Waghorne.

92. Campylopus Bridel.

I. **Thysanomitrium.** Leaves often falcate; alar cells short dilated, separated from leaf-borders by narrow (marginal) cells; other cells rectangular; costa long-excurrent somewhat narrow.

II. **Anotis.** Leaves not falcate; alar cells gen. wanting (or indistinctly evolute), the angular narrow gen. not much defined from the other basal ones; upper cells short irregular; costa very broad but often short-excurrent.

III. **Eu-Campylopus.** Leaves sometimes falcate; alar cells short dilated well-defined; other cells short gen. irregular; costa sometimes (in *C. flexuosus*) not or scarcely excurrent. Leaves involute above.

I. Thysanomitrium Schwægrichen.

1.**C.uncinatus** Harvey. — Thysanomitrium Harv.; Campylopus Kindb. Laubm. S. u. N.; Dicranodontium circinnatum Schimper.

Leaves from half-sheathing base abruptly tapering to a much longer, subulate acumen, faintly serrulate, patent; alar cells hyaline fugitive. Tufts green loose. Very r. fruiting. — Shaded rocks princ. in alps r. *Eur.* Switzerl.! Norway: E Nyman. Scotland: Fergusson. Austria: Breidler.

II. Anotis Kindberg.

A. Leaf-base whitish glossy. Leaves and branchlets brittle. Leaves appressed when dry.

2.**C.fragilis** Dickson. — Bryum Dicks.; Campylopus Br. eur.

Leaves not involute above; upper cells gen. rhombic; costa gen. long-excurrent, sulcate at back, faintly denticulate at apex. Tufts tomentose not high. R. fruiting. — Rocks, esp. of sandstone, and turfy soil. *Eur.* not r. Switzerl.!

B. Leaf-base more or less dusky. Leaves and branchlets r. brittle. Leaves gen. (exc. *C. Schimperi*) not appressed.

a. Leaves not involute above; costa long-excurrent. Not r. fruiting.

3.**C.piriformis** Schultz. — Dicranum Schz.; Campylopus Bridel; **C. turfaceus Br. eur.**

Upper leaf-cells subrhomboidal; costa sometimes sulcate. Stem short, radiculose at base. — Heaths and moorlands. *Eur.* not r. Sweden: Aokerman, com. Lindberg. England: Holt. France: Du Noday.

b. Leaves involute above; costa gen. less long-excurrent. **Very r. fruiting.**

4.**C.subulatus** Schimper. — C. brevifolius Br. eur.

Upper leaf-cells gen. rhombic-quadrate, the alar sometimes nearly distinct; costa faintly sulcate, sometimes hyaline at apex. Tufts very low without rhizoids. — On stones r. *Eur.* princ. in warmer districts. Switzerl.! Belgium: Gravet. France: Berthoumieu. Austria: Breidler. Sweden: P. Larsson.

5.**C.Heinrici** Renauld et Cardot.

Differs from the last: »Leaves brittle; upper cells longer rectangular; costa longer excurrent, not sulcate»: Ren. et Card. — ***Amer.* r. »U. S.»: R. et C.**

6.**C.Schimperi** Milde. — Leptotrichum tomentosum Kindb. **note on Can. Bryol.**

Leaves us. appressed when dry; upper cells oval-rhomboidal; costa not sulcate. Tufts tomentose often very low, sometimes high. — Damp rocks princ. in alps r. *Eur.* Switzerl., Norway! Austria: Breidler. Engl.: Holt. *Amer.* Alaska: J. M. Macoun.

III. Eu Campylopus.

A. Leaves somewhat short, distinctly denticulate above at lamina, flexuous when dry; costa long-excurrent gen. without hyaline hairpoint. Capsules unknown.

7.**C.Donnellii** Austin. — Dicranum Aust.; Campylopus Lq. et Jam.

Leaves abruptly attenuate, indistinctly auricled, not large; upper cells oval-rhombic; costa not sulcate. Tufts greenish tomentose not high. — *Amer.* U. S., Florida: Austin, com. Cardot.

8.**C.subleucogaster** C. M. — Dicranum (Campylopus) C. M.

»Differs from the last in its dirty yellow color, leaves less open and less abruptly narrowed, costa broader; terminal branchlets bristle» Lesq. et Jam. — »Leaves distinctly auricled; upper cells quadrate; costa serrulate at apex. Tufts loose, about 3 c. m. high. Stem with very short, densely crowded branches at apex. — *Amer.* r. U. S., Alabama: Mohr»; C. M. **in Flora 1875.**

B. Leaves long gen. entire or (in *C. Mildei* and *C. setifolius*) denticulate above, us. appressed when dry; costa long-excurrent.

a. Upper leaves us. with long whitish hairpoint.

9.**C.introflexus** Hedwig. — Dicranum H.; Campylopus Brid.; C. polytrichoides Notaris; C. leucotrichus Sull. icon. m.

Leaves straight rigid not distinctly auricled, us. appressed when dry; basal lamina not involute; upper cells rhomboidal-oblong or often curved; costa very broad, deeply sulcate. Male plants with short reddish perigonial leaves. Tufts radiculose us. green or yellowish, sometimes blackish. Very r. fruiting. — Dry heaths and rocks. *Eur.* Switzerl.! *Amer.* »U. S.»: Sulliv.

10.**C.brevipilus** Br. eur.

Differs from the last: Leaves less rigid, sometimes faintly flexuous; basal lamina partly involute; costa not deeply sulcate, less broad; hairpoint short sometimes wanting. Tufts nearly eradiculose us. yellowish. Capsules unknown. — Moist heaths r. *Eur.* France: Renauld, com. Husnot.

11.**C.atrovirens** Notaris.

Leaves not rigid, sometimes flexuous or falcate, us. auricled; upper cells gen. oblong or vermicular; costa not deeply sulcate, not very broad. Tufts sparingly radiculose us. blackish or dark green. Very r. fruiting. — Wet rocks and peaty ground. *Eur.* Switzerl.! Norway: R. Hartman. France: Husnot.

* **C.adustus** Notaris.

Leaves nearly straight, less distinctly auricled; upper cells often rhomboidal. Tufts blackish brown when dry. Capsules unknown. — Dry rocks r. *Eur.* Switzerl. in higher subalp. region near Faido!

12.**C.gracilicaulis** Mitten.

Differs from *C. atrovirens* in not auricled leaves; upper cells often rhombic. »Capsule immersed in the comal leaves»: Lesq. et Jam. *Amer.* r. U. S., Florida: Austin, com. Cardot.

* **C.angustiretis** Austin. — Dicranum Austin; Campylopus Lesq. et Jam.

»Leaf-cells much longer, sublinear, the alar dirty red. *Amer.* U. S., Florida»: Lesq. et Jam.

b. Leaves without distinct (hyaline) hairpoint, sometimes (exc. *C. Mildei*) falcate or r. (in *C. setifolius*) flexuous.

13.**C.Mildei** Limpricht.

Leaves nearly appressed when dry, straight, less rigid than in *C. introflexus*, sometimes denticulate above; auricles gen. not much distinct; upper cells oval-rhombic; costa not much deeply sulcate. Stem more or less radiculose, often very long. Tufts gen. green above, brown below. Capsules unknown. — Dry and moist rocks r. *Eur.* Switzerl. near Lugano!

14.**C.Shawii** Wilson.

Leaves not rigid, abruptly attenuate, entire; auricles indistinct; upper cells oval-rhombic; costa not sulcate, nearly entire. Tufts tomentose green. Capsules unknown. Habit of *Dicranum albicans.* — Bogs r. *Eur.* Scotl.: Shaw, com. Bottini.

15.**C.setifolius** Wilson.

Leaves not rigid, denticulate above; auricles large; upper cells rhombic; costa not sulcate, very rough in upper part. Capsules clustered; calyptra unknown. Tufts nearly eradiculose, blackish or dark green; stem very long. Very r. fruiting. — Rocks r. *Eur.* Irel.: G. A. Holt.

16.**C.Schwarzii** Schimper.

Leaves not rigid, entire, r. falcate; auricles large; upper cells rhombic-rectangular; costa sulcate nearly entire. Capsules unknown. Tufts sparingly radiculose, greenish or blackish, often high. Habit of *Dicranum longifolium.* - Rocks in alps and near Atlantic sea. *Eur.* Switzerl.! Irel.: Holt. Norway: R. Hartman.

***C.micans** Wulfsberg.

Tufts yellowish more radiculose. Leaves often falcate. Pedicels of capsules clustered. — *Eur.* Norway: Wulfsberg. Sweden: P. Larsson.

C. Leaves gen. denticulate above, us. flexuous when dry; costa not hyaline at apex, us. subpercurrent.

17 **C.flexuosus** L. — Bryum L.; Campylopus Bridel.

Leaves often auricled; upper cells suboval-rhomboidal, the alar us. brown-yellow; costa occupying about half lamina at base, sulcate only at apex. Tufts us. brown-tomentose. Less r. fruiting. — Turfy soil and moist sandstone rocks. *Eur.* not r. Switzerl.! *Amer.* r. »U. S.»: Sulliv.

***C.zonatus** Molendo.

Leaves more distinctly denticulate; alar cells purplish (as tomentum of stem); costa narrower. — *Eur.* r. France: Le Jolis.

***C.paradoxus** Wilson.

Leaves gen. entire; costa narrower, percurrent. Tufts less radiculose. Capsules unknown. — Peaty soil r. *Eur.* Engl.: Wood, com. Husnot. Sweden: P. Olsson.

***C.tallulensis** Sull. et Lesq.; Sulliv. icon. m.

Leaves narrower, denticulate near apex; costa percurrent.

Tufts sparingly radiculose, yellowish green. Capsules unknown. — Wet rocks r. — *Amer.* »U. S.»: Sullivant.

93. **Dicranella** Schimper.

I. **Anisothecium**. Leaves spreading, from sheathing base horizontally patent or deflexed. Capsule inclined; pedicel red.
II. **Pseud-Oncophorus.** Leaves flexuous or erect-patent, not spreading. Capsule inclined distinctly necked and strumose; pedicel yellow (reddish only when old).
III. **Eu-Dicranella.** Leaves not spreading. Capsule not distinctly necked; pedicel red or (in *D. heteromalla*) yellow.

I. Anisothecium (Mitten) Lindberg.

A. Leaves large gradually tapering to the broad acumen. Stem us. high. R. fruiting.

1.**D.squarrosa** Starke. — Dicranum St.; Dicranella Schimp.

Leaves with nearly entire often obtuse acumen; upper cells oval or suboblong; costa not percurrent. Capsule large not striate. — Moors princ. in alps. *Eur.* not r. Norway (fruit.), Sweden, Switzerl.! Engl. (fruit.): Manchester Cryptog. Society. *Amer.* Can.: Macoun.

B. Leaves less large abruptly tapering to the long subulate acumen. Stem us. low.

2.**D.Schreberi** Swartz. — Dicranum Sw.; Dicranella Schimp.; Cynodontium canadense Mitten; Dichodontium Lq. et Jam.

Leaves with an in upper part serrulate acumen; cells irregular often rhomboidal, upper suboblong; costa percurrent. Capsule smooth not large. — Clay soil not r. *Eur.* Sweden!; Lindberg; M. Huss. Engl.: Holt. *Amer.* Can.: Macoun.

3.**D.Grevillei** Bryol. eur.

Leaves entire; cells oblong-lanceolate; costa excurrent. Capsule small finally striate or sulcate, indistinctly strumose. — Clay soil princ. in alps r. *Eur.* Norway, Switzerl.! Sweden: M. Huss. *Amer.* Can.: Drummond; Macoun.

II. Pseud-Oncophorus Kindb.

4.**D.cerviculata** Hedwig. — Dicranum H.; Dicranella Sch.

Leaves from half-sheathing base abruptly narrowed to a long subulate acumen, us. flexuous or crisped; cells narrow irregular; costa broad long-excurrent. Capsule finally plicate; teeth cleft to middle. Tufts yellowish green. — Bare soil on wet heaths and in ditches. *Eur.* common. Sweden! *Amer.* Can.: Macoun.

* **D.pusilla** Hedwig. — Dicranum H.; Dicranella Sch.

»Plants smaller. Leaves shorter, nearly straight and not flexuous. Capsule very small, less distinctly strumose. — Higher alp. region r. *Eur.* Switzerl.»: Schimper.

5.**D.polaris** Kindb. note on Canad. bryol. 1893.

Differs from *D. cerviculata:* Plants smaller. Leaves shorter nearly straight and not flexuous; upper cells suboblong; costa broader, filling the whole acumen. Capsule very small and not striate, less distinctly strumose; teeth nearly entire or faintly cleft. Stem very short. — Arctic distr. r. *Amer.* Alaska: J. M. Macoun.

6.**D.cerviculatula** Kindb. l. c.

Differs from *D. cerviculata*: Leaves gradually narrowed; cells short quadrate, only the inner basal narrow; costa narrower and well-defined, only in perichetial leaves distinctly excurrent. Tufts dark green. — *Amer.* r. Can. Hudson Strait: R. Bell, com. Macoun.

III. Eu-Dicranella.

A. Leaves channelled; costa long-excurrent.

a. Leaves abruptly acuminate from the us. half-sheathing base

7.**D.secunda** Swartz. — Dicranum Sw. 1795; Dicranella Lindberg; D. subulata (Hedwig 1801) Schimper.

Leaves entire with suboblong base, subfalcate not crisped; lower cells narrow, the upper oblong; costa gen. entire. Capsule cernuous finally sulcate; teeth cleft to middle; lid long-rostrate; annulus revoluble. — Wet stony ground princ. in alps. *Eur.* not r. Sweden, Norway, Switzerl.! Finl.: Brotherus. *Amer.* Can.: J. Macoun. Alaska: J. M. Macoun.

* **D.curvata** Hedwig. — Dicranum H.; Dicranella Sch.

Leaves with shorter base; costa denticulate above. Perichetial leaves not convolute. Capsule us. erect. — Wet sandstone rocks r. *Eur.* Germany: Huebner. France: Boulay, com. Husnot. *Amer.* »U. S.»: Lesq. et Jam.

8.**D.crispa** Ehrhart. — Dicranum Ehrh.; Dicranella Sch.

Leaves entire with subovate base, crisped when dry; cells gen. narrow; costa minutely denticulate near apex. Capsule erect finally sulcate; teeth red-brown cleft to middle; lid long-rostrate; annulus not wholly revoluble. — Sandy ground. *Eur.* not r. Norway, Sweden! Engl.: Holt. *Amer.* Can.: Macoun.

9.**D.parvula** Kindb. bull. Torr. club 1889.

Leaves crenulate all around with subovate base, crisped or curved when dry; basal cells long linear, upper oblong-quadrate; costa denticulate above. Capsule inclined or suberect; teeth orange nearly partite; lid short subobtuse or apiculate; annulus scarcely loosed; pedicel pale red. Stem very short. — Earth in higher alp. region r. *Amer.* Can. Rocky mts 1950 metr. a. s.: Macoun.

b. Leaves gradually acuminate from not sheathing base. Pedicel yellow.

10.**D.heteromalla** L. — Bryum L.; Dicranella Sch.

Leaves flexuous or straight when dry, sometimes denticulate; lower cells long, upper shorter; costa broad us. denticulate near apex. Capsule nitid orange more or less oblique and inclined, r. suberect, finally sulcate; teeth cleft to middle; lid long-rostrate. Tufts us. green often soft and silky-like. — Damp earth and rocks common. *Eur.* Sweden, Norway, Germany, Switzerl.! *Amer.* Can.: J. Macoun; Waghorne. Alaska: J. M. Macoun. U. S.: com. Macoun (a variety with longer not distinctly sulcate capsule).

* **D.Fitzgeraldi** Renauld et Cardot.

Capsule suberect and subsymmetric. — *Amer.* U. S.: Fitzgerald, com. Cardot.

B. Leaves carinate gradually acuminate not sheathing; costa gen. not excurrent. Capsule not or indistinctly striate. Tufts low us. not shining.

a. Leaves entire, recurved below; alar cells us. dilated.

11.**D.rubra** Dickson. — Bryum Dicks.; Dicranella Brotherus; D. varia Schimper; D. Howei and D. Langloisii Renauld et Cardot.

Leaves ovate-lanceolate or ovate-oblong us. nearly straight: upper scarcely longer; cells gen. narrow exc. the alar. Capsule inclined red-brown us. oblique; teeth us. not deeply cleft: lid rostellate not longer than half capsule; annulus none. Tufts yellowish green. — Damp clay soil and rocks. *Eur.* common. Sweden, Switzerl.! Italy: Arcangeli. *Amer.* not r. Can.: Macoun. U. S.: Sullivant; Howe; Langlois, com. Cardot (a var. with short leaves).

* **D.callistoma** Dickson. — Bryum Dicks.; Dicranella Sch.

Capsule smaller, subsymmetric often erect, gen. not longer than lid. — Rocks princ. in subalp. distr. r. *Eur.* Engl.: Rogers. France: Le Jolis. Greece: Heldreich.

12.**D.debilis** Hooker et Wilson. — Dicranum H. W.; Sulliv. ic. m.; Dicranella Lq. et Jam.; D. leptotrichoides Ren. et Card.

Differs from *D. rubra *callistoma*: Capsule annulate; teeth nearly partite. Upper leaves much longer than the lower. —

Ditches and roadsides r. *Amer.* U. S.: Sulliv. et Lesq., com. Renauld; Langlois, com. Cardot.

b. Leaves serrulate above, not recurved; alar cells not defined.

13.**D.rufescens** Dickson. — Bryum Dicks.; Dicranella Sch.

Leaves longer upwards, nearly straight or curved: the uppermost narrowly ovate-lanceolate; cells less narrow than in *D. rubra.* Capsule symmetric blood-red us. erect; teeth cleft nearly to middle; lid rostellate us. half as long as capsule; annulus none. Tufts often rufescent. Male plants resembling a *Phascum.* — Wet clay and stony ground. *Eur.* not r. Sweden: R. Hartman; M. Huss. *Amer.* Can.: J. Macoun. Alaska: J. M. Macoun.

***D.humilis** Ruthe.

Capsule inclined and curved when dry. Leaves pale green, the upper more flexuous. — Sandy and clay soil r. *Eur.* Norway: N. Bryhn.

94. **Dicranoweisia** Lindberg.

A. Leaves recurved gradually acuminate; costa not excurrent. Peristomial teeth not cleft; annulus revoluble.

1.**D.cirrata** L. — Mnium L.; Dicranoweisia Lindb.

Leaves subulate-acuminate; alar cells not well-defined; costa subpercurrent. Perichetial leaves abruptly narrowed to a shorter acumen; costa vanishing below it. Capsule erect cylindric pale or yellowish brown. Tufts pale green. — Logs and rocks not r. *Eur.* Sweden, Switzerl.! *Amer.* Can.: Macoun.

B. Leaves not recurved. Peristomial teeth us. cleft; annulus indistinct.

a. Leaves abruptly acuminate; costa not excurrent. Capsule straight symmetric. Perichetial leaves very short.

2.**D crispula** Hedwig. — Weisia H.; Dicranoweisia Lindb.

Leaves with long subulate channelled acumen; alar cells well-defined. Capsule pale brown us. oval-oblong, or cylindric when young, r. cylindric when old; teeth sometimes entire. Perichetial leaves short-apiculate. Tufts brown or blackish when dry. — Rocks princ. in alps, common in alp. regions. *Eur.* Norway, Switzerl.! Sweden: Miss O. Cron. Spetsbergen: Berggren. *Amer.* Greenl.: Berggren. Alaska: J. M. Macoun. Can.: J. Macoun; Waghorne. U. S.: Henderson, com. Cardot.

3.**D.compacta** Schleicher. — Grimmia Schl.; Dicranoweisia Schimp.

Differs from the last: Leaves with sublinear not long often obtuse acumen: perichetial longer-apiculate. Capsule suboval red-brown smaller. Tufts lower often green. — Rocks in higher alp. regions r. *Eur.* Switzerl.!; Schimper. Italy: Husnot m. gall. Norway: R. Hartman. Sweden: E. Adlerz; E. Nyman.

b. Leaves nearly gradually long-subulate; costa excurrent. Perichetial leaves long-acuminate. Tufts green. Capsule small.

4.**D.Roellii** Kindb. in Hedwigia 1896 p. 59.

Alar leaf-cells not well-defined or rectangular. Perichetial leaves abruptly narrowed to a by costa often wholly filled acumen. Capsule red-brown round-oval symmetric not strumose; pedicel flexuous or arcuate when dry, not long. Tufts very compact. — Rocks in higher alp. region r. *Amer.* U. S. Oregon mt Hood 2400 metr. a. s. near a glacier: J. Roell.

5.**D.obliqua** Kindb. note on Canad. bryol. 1893.

Alar leaf-cells quadrate well-defined. Perichetial leaves less abruptly acuminate, not filled by costa in lower part of acumen. Capsule pale brown suboblong inclined curved or subobovate with very small mouth, often strumose; pedicel long straight or slightly curved. — Stones in alp. region r. *Amer.* Pacif. distr. Can. Brit. Col.: J. Macoun. Alaska: J. M. Macoun.

95 **Oncophorus** Bridel.

1.**O.virens** Swartz. — Bryum Sw.; Oncophorus Brid.; Cynodontium Schimper; C. Demetrii Ren. et Card. ?

Leaves reflexed at borders, from suboblong base less abruptly tapering to the attenuate acute entire or in upper part densely denticulate acumen, more or less crisped when dry. Perichetial leaves abruptly acuminate to the long-excurrent costa. Capsule subovate. — Rocks princ. in alps. *Eur.* common in alps. Norway, Switzerl.! Sweden: P. Dusén. *Amer.* Can.: Macoun; Waghorne.

2.**O.Wahlenbergii** Bridel.

Leaves not reflexed, from broad base abruptly tapering to a sublinear entire or at apex obsoletely denticulate acumen, much crisped. Perichetial leaves less abruptly tapering to a by costa not wholly filled acumen. Capsule subovate or subobovate. — Alp. swamps and rocks. *Eur.* not common. Norway! Sweden: Arnell. Italy: Payot, com. Husnot. *Amer.* Can. common in eastern colder districts: J. Macoun; Drummond; Waghorne. Greenl.: Berggren. Alaska: J. M. Macoun; Palmer.

* **O.compactus** Funck. — Dicranum Funck; Oncophorus Kindb.

Leaves entire smaller. Stem and pedicel shorter; capsule smaller. — Rocks in alp. princ. arctic districts r. *Amer*. Greenl.: Vanhoeffen. Can.: Waghorne. *Eur*. »Sweden»: Hartman.

96. Rhabdoweisia Bryol. eur.

A. Peristomial teeth brittle us. with broad base. Leaves gradually acuminate us. entire.

1.**R.striata** Schrader. — Grimmia Schrad. 1799; Rhabdoweisia Kindb.; Weisia fugax Hedwig 1801.

Leaves sublinear acute, curled when dry. Capsule suboval pale ferruginous; pedicel yellow very short. — Fissures of rocks. *Eur*. not r. Sweden, Norway, Switzerl.! *Amer*. r. Can. Sudbury Junction: Macoun.

B. Peristomial teeth persistent subulate. Leaves obtusate serrulate above.

2.**R.crispata** Dickson. — Bryum Dicks. 1793; Rhabdoweisia Kindb.; Weisia denticulata Bridel 1806.

Leaves linear acute, more or less curled. Capsule suboblong brownish; pedicel yellow. — Fissures of rocks. *Eur*. somewhat r. Sweden, Switzerl.! Engl.: Rogers. *Amer*. r. Can.: Drummond, com. Macoun.

3.**R.crenulata** Mitten. — Didymodon Mitt.; Rhabdoweisia Jameson; Oncophorus Braithwaite.

Leaves sublinear gen. obtuse, broader and more strongly serrulate than in the last, not much curled; cells larger. Capsule oval rufous or reddish; teeth sometimes cleft; pedicel finally pale red. — Wet rocks r. *Eur*. France cascade d'Enfer near Bagnères de Luchon 1855! Engl.: T. Rogers.

97. Oreas Bridel.

1.**O.Martii** Hoppe et Hornschuch. — Weisia Hop. et Hsch.; Oreas Brid.; Oncophorus Lindb.

Leaves entire sublinear acuminate or with broader base, recurved below. Capsule suboval rostellate; pedicel arcuate when moist. Tufts very dense often high. — Rocks in alp. regions r. *Eur*. Switzerl.! Austria: Schimper.

Fam. 22. Seligeriaceæ.

98. Seligeria Bruch et Schimper.

I. **Anodus.** Peristome none. Leaves denticulate.

II. **Eu-Seligeria.** Peristome present. Leaves entire or (sometimes in *S. pusilla*) faintly crenulate.

I. Anodus Bryol. eur.

1.**S.Donii** Smith. — Gymnostomum Sm.; Seligeria C. M.

Leaves channelled shortish; costa long-excurrent. Capsule piriform; pedicel straight. Stems very short not tufted. — Limestone and sandstone rocks. *Eur.* Switzerl.! Sweden: J. Hulting. Norway: Arnell. Engl.: Rogers. *Amer.* Can.: Drummond; Macoun.

II. Eu-Seligeria.

A. Leaves long subulate-acuminate plurifarious; costa us. excurrent.

a. Stem very short. Capsule piriform or subclavate.

2.**S.recurvata** Hedwig. — Grimmia H.; Seligeria Br. et Sch.; S. setacea (Wulfen) Lindb.

Leaves with long-excurrent costa. Capsule piriform; teeth obtuse or subacute; pedicel us. arcuate. Loosely tufted. — On sandstone. *Eur.* not r. Sweden, Italy, Switzerl.! Engl.: Rogers. *Amer.* Can.: Drummond; Macoun.

* **S.erecta** Philibert. — »Weisia Seligeri Hooker et Wilson»: Lq. et Jam.

Leaves shorter. Pedicel us. straight erect. — Rocks r. *Eur.* Switzerl.: Philibert. *Amer.* »U. S.: Drummond»: Lesq. et Jam.

3.**S.pusilla** Ehrhart. — Afzelia Ehrh.; Seligeria B. S.

Leaves of fruiting stem with a not distinctly excurrent costa. Capsule piriform erect; teeth obtuse; pedicel straight. Loosely tufted. — Damp shady rocks of limestone or sandstone. *Eur.* Switzerl.! Sweden: E. Adlerz. Norway: E. Nyman. Engl.: Whitehead. *Amer.* »Can. and U. S.»: Lesq. et Jam.

* **S.acutifolia** Lindberg.

Leaves with more distinctly excurrent costa. Pedicel often very short. — *Eur.* r. Engl.: Rogers.

4.**S.paucifolia** Dickson. — Bryum Dicks.; Seligeria Carruthers; Braithwaite; S. subcernua Schimper.

Leaves with us. short-excurrent costa. Capsule subclavate sometimes inclined; teeth acute; pedicel suberect flexuous. — Chalk blocks r. *Eur.* »Engl.»: Braithwaite.

b. Stem somewhat high about 1 c. m. Capsule subglobose or oval.

5.**S.polaris** Berggren.

Leaves with long excurrent costa. Capsule subglobose; teeth subacute somewhat long; pedicel exserted not or slightly curved. Densely tufted. — On earth in arctic district r. *Eur.* Spetsbergen: Berggren, com. A. G. Nathorst.

6.**S.subimmersa** Lindberg musci scandinav.

»Differs from *S. recurvata* in the stem higher, to 1 c. m.; angular leaf-cells dicranoid; capsule oval scarcely emergent above perichetial leaves; tufts very dense. — *Eur.* r. Finl.: Silén»: Lindberg.

B. Leaves short us. obtuse. Stem low.

a. Leaves obtuse, tristichous princ. on sterile shoots. Stem and shoots somewhat elongate. Capsule piriform with straight pedicel; teeth obtuse.

7.**S.tristicha** Bridel. — Weisia Brid.; Seligeria B. S.

Leaves sublinear; costa distinctly excurrent. Perichetial leaves gradually acuminate; costa long-excurrent. — Dripping calcareous rocks r. *Eur.* Engl.: Rogers; Cash. France: Boulay. *Amer.* Can.: Macoun.

8.**S.tristichoides** Kindb. revue bryol. 1896.

Leaves sublinear, broader than in the last; costa not distinctly excurrent. Perichetial leaves abruptly acuminate; costa percurrent or short-excurrent. — *Eur.* r. Norway in northern district: Schlegel and Arnell; E. Nyman.

b. Leaves plurifarious. Stem and shoots very short.

9.**S.calcarea** Dickson. — Bryum Dicks; Seligeria B. S.

Leaves subovate abruptly attenuate; costa excurrent. Capsule piriform erect; teeth obtuse; pedicel straight. — Calcareous or schistaceous rocks r. *Eur.* Switzerl.! France: Husnot m. gall. *Amer.* Can.: Drummond; Macoun.

* **S.crassinervis** Lindberg.

»Capsule inclined; teeth acute; pedicel slightly curved at apex. — *Eur.* r. Sweden»: Lindberg.

10.**S.diversifolia** Lindberg. — S. compacta Philibert rev. bryol. 1897 ?

Leaves (also the perichetial) sublinear or narrowly ovate-oblong, gradually attenuate obtuse; costa not excurrent. Capsule erect narrowly piriform; teeth subobtuse; pedicel straight. — Calcareous rocks r. *Eur.* Finl.: Brotherus.

* **S.obliquula** Lindberg.

Capsule broader; teeth acute; pedicel slightly curved when dry. — Alp. rocks r. *Eur.* Norway in Dovrefjeld: Kaurin.

11.**S.campylopoda** Kindb. cat. Canad. m.

Leaves as in the last but the upper perichetial acute or subacute. Capsule narrowly piriform finally sulcate; pedicel strongly arcuate when moist. — Calcareous rocks r. *Eur.* A. Blytt and H. W. Arnell. *Amer.* Can.: Macoun; Waghorne.

99. **Brachydontium** Bruch.

1.**B.trichodes** Weber fil. — Gymnostomum W. f.; Brachydontium Bruch.

Leaves ovate-oblong shorter than the by costa nearly wholly filled point, curled when dry. Capsule oblong sulcate when dry; teeth pale truncate not reaching above annulus; lid rostellate; pedicel erect. Stems not tufted. — Rocks. *Eur.* princ. in middle and south. distr. Germany! France: Boulay. Austria: Breidler. *Amer.* »U. S.»: Lesq. et Jam.

100. **Trochobryum** Breidler et Beck.

1.**T.carniolicum** Breidler et Beck.

Leaves subovate-oblong; the upper flexuous or deflexed with a many times longer costa. Capsule rotundate or round-oval not sulcate; teeth blood-red truncate; lid systylic convex with short thick point; pedicel erect. — Moist calcareous rocks r. *Eur.* Serbia: Ilie, com. C. Mueller.

101. **Blindia** Bruch et Schimper.

I. **Eu-Blindia.** Capsule exserted; lid soon deciduous; peristome present. Dioecious.

II. **Stylostegium.** Capsule immersed; lid often systylic; peristome none. Monoecious.

I. Eu-Blindia.

1.**B.acuta** Hudson. — Bryum Huds.; Blindia Br. eur.

Leaves broadly ovate-lanceolate gradually acuminate, nearly straight, gen. not much longer than the excurrent part of costa; alar cells red large quadrate; costa us. smooth. Perichetial leaves abruptly acuminate larger. Capsule suboval-piriform or globose with short neck; lid red-rostrate; teeth red; annulus not distinct; pedicel straight reddish. Tufts us. brown. — Wet rocks princ. in alps. *Eur.* not uncommon. Sweden, Norway, Switzerl.! *Amer.* Can.: Macoun; Moser; Waghorne. Greenl.: Vanhoeffen.

2.**B.flexipes** (Renauld et Cardot as var.) Kindb. n. sp.

Leaves as in the last but often falcate; costa denticulate above, shorter-excurrent. Perichetial leaves gradually acuminate. Capsule as in the last; pedicel flexuous arcuate yellow above. Tufts green or yellowish green. — Wet rocks r. *Amer.* Pacif. distr. Can.: Macoun. U. S.: Howell, com. Cardot.

II. Stylostegium Bryol. eur.

3.**B.cæspiticia** Schwægrichen. — Anoectangium Schw.; Blindia C. Mueller.

Leaves suboblong gradually acuminate nearly straight; alar cells brown subquadrate; costa long-excurrent. Perichetial leaves less gradually acuminate and very much larger; costa short-excurrent. Capsule obovate or turbinate; lid yellow-rostrate;

pedicel straight yellowish. Resembling small forms of *B. acuta* in habit. — Alp. rocks r. *Eur.* Norway! Scotl.: Hunt.

Fam. 23. Grimmiaceæ.

102. **Grimmia** Ehrhart.

A. Leaves spirally twisted about stem when dry.

I. **Streptophyllum.** Leaf-cells more or less sinuous. Capsule exserted smooth; pedicel longer, us. deflexed; lid not systylic; peristome present. Dioecious r. fruiting.

B. Leaves not spirally twisted.

II. **Eu-Grimmia.** Leaf-cells not distinctly sinuous. Capsule shorter than the gen. exserted pedicel; lid not systylic; peristome present.

a. Leaves smooth obtusate entire and not sheathing, appressed when dry and not patent when moist; cells large; hairpoint very short or wanting. Dioecious.

1. **Molliformes.** Leaves large. Tufts gen. loose. Stem elongate.

2. **Velutinæ.** Leaves very small. Tufts compact pulvinate very low.

b. Leaves smooth or (in *G. cæspiticia*) papillose, us. acuminate, patent when moist; cells small; hairpoint often long. Often monoecious. Tufts us. pulvinate.

3. **Pulvinatæ.** Leaves gradually narrowed or obtuse, not sheathing; cells us. short. Capsule often striate; pedicel often curved.

4. **Alpestriformes.** Leaves abruptly narrowed from half-sheathing base; basal cells often long. Capsule not striate; pedicel r. curved.

c. Leaves papillose crenulate, appressed when dry; cells small.

5. **Andreæoideæ.** Capsules unknown.

III. **Pseudo-Racomitrium.** Leaves ovate-lanceolate or sublinear; cells (princ. the upper basal) sinuous, the inner basal narrow-linear. Capsule as in *Eu-Grimmia.*

a. Leaves carinate above, often recurved below.

aa. Leaves (princ. the younger) papillose. Dioecious.

1. **Papillosæ.** Leaves not crisped but often nearly appressed when dry. Pedicel of capsule arcuate.

bb. Leaves smooth. Often monoecious.

2. **Crispulæ.** Leaves very narrow sublinear us. crisped. Pedicel of capsule arcuate or straight. Dioecious very r. fruiting.

3. **Trichophylloideæ.** Leaves less narrow, ovate-lanceolate not crisped. Capsule often striate-sulcate; pedicel arcuate when moist. Plants often robust.

4. **Ovatæformes.** Leaves ovate-lanceolate not crisped. Capsule smooth; pedicel not arcuate. Plants gen. not robust.

b. Leaves channelled above, not recurved.

5. **Unicoloriformes.** Leaves smooth us. narrowly ovate-lanceolate, not or faintly crisped; upper cells us. opake. Pedicel straight or arcuate, sometimes not emergent. Dioecious.

IV. **Pseudo-Schistidium.** Leaf-cells sometimes sinuous. Capsule immersed longer than pedicel; lid not systylic.

1. **Piliferæ.** Leaves channelled or near apex carinate, recurved below at both sides; cells sinuous. Peristome present. Dioecious.

2. **Crinitæ.** Leaves concave not recurved; cells often not sinuous. Peristome present or wanting. Us. monoecious.

V. **Schistidium.** Leaf-cells sometimes sinuous. Capsule immersed longer than pedicel; lid systylic. Monoecious.

1. **Platyphylloideæ.** Leaves channelled; cells gen. not sinuous.

2. **Apocarpæformes.** Leaves carinate; cells not r. sinuous.

I. Streptophyllum Kindb.

A. Leaves sublinear-subulate, gradually or nearly gradually narrowed from the not distinctly sheathing and (when moist) not appressed base; hairpoint short often wanting.

1. **G. torquata** Hornschuch.

Leaves gradually narrowed, open when moist; cells thick-walled finally yellow, nearly all rectangular and sinuous; costa pellucid. Tufts not cohering finally yellowish (when moist). Capsule with arcuate pedicel. — Rocks princ. below alps. *Eur.* Sweden!; Lindberg. Finl.: Brotherus. *Amer.* Can.: Macoun. U. S. fruiting: Leiberg, com. Mrs Britton.

2. **G. prolifera** C. M. et Kindb. cat. Can. m.

Leaves nearly gradually narrowed, spreading when moist; cells thin-walled faintly yellowish: basal narrow-rectangular and more or less sinuous, upper subquadrate not sinuous; costa faintly pellucid. Tufts cohering blackish below. Capsules unknown. Stem sometimes proliferous with long green loosely foliated shoots. — Alp. rocks r. *Amer.* Can. Brit. Col.: Macoun; N. Foundl.: Waghorne.

B. Leaves abruptly narrowed from sheathing base; upper cells short quadrate not sinuous; hairpoint often long.

3.G.funalis Schwægrichen. — Trichostomum Schw.; Grimmia Schimp.

Leaves with subulate acumen, shorter than in *G. torquata* and not large, us. brown when moist; cells not yellow: basal rectangular, middle short-rectangular or subquadrate sinuous, upper dusky very small and not well-defined; costa brown opake; hairpoint often long. Capsule with arcuate pedicel. Tufts not cohering, blackish or r. pale brown. Less r. fruiting. — Alp. rocks. *Eur.* not r. Norway, Switzerl.! Sweden: R. Hartman. France: Husnot. *Amer.* Greenl.: Berggren.

4.G.tortifolia Kindb. enumer. bryin. dovrens. — G. streptophylla Kindb. Laubm. Schwed. u. Norw.

Leaves small and short, subovate-oblong with acute or subobtuse acumen, us. dark green when moist; cells gen. not yellow: nearly all quadrate and not distinctly sinuous, only the lowest basal rectangular hyaline; upper cells well-defined larger than in the last and not dusky; costa not opake; hairpoint very short us. wanting. Capsules unknown. Tufts densely cohering, dark green when dry. — Alp. rocks r. *Eur.* Norway in Dovrefjeld!

* **G.calvescens** Kindb. enum. bryin. dovr. — G. imberbis Kindb. botan. notiser.

Leaves small subovate or subovate-oblong gen. obtuse, green when moist; cells not (or r. faintly) yellow: all basal rectangular, the middle faintly sinuous. Capsule suberect with nearly straight pedicel. — Alp. rocks r. *Eur.* Norway, Switzerl.! Sweden: E. Nyman. Austria: Venturi. *Amer.* U. S.: Roell.

* **G.pellucida** Kindb. in Hedwigia 1896 p. 64.

Leaves larger and longer, ovate-lanceolate subacute bright green; cells pale pellucid, nearly all quadrate and not distinctly sinuous; costa pellucid. Capsules unknown. Tufts pale green when dry. — *Amer.* r. Can. Brit. Col. and Vanc. isl.: Macoun. U. S.: Roell.

* **G.pseudo-torquata** Kindb. n. subsp.

Leaves somewhat larger, ovate-lanceolate acute, green or the uppermost yellow when moist; basal and middle cells sinuous and rectangular; costa nearly opake. Capsules unknown. Habit of *G. prolifera.* — Alp. and subalp. rocks r. *Eur.* Norway in Dovrefjeld and Gudbrandsdal! Sweden in Jemtland: P. Dusén.

* **G. Ryani** Kaurin.

Resembling a large form of *G. funalis* and more robust. Leaves large broadly ovate-lanceolate acute, gen. brownish or the uppermost pale yellow when moist; basal and middle cells sinuous and rectangular; costa brown opake; hairpoint often present. Capsule with arcuate pedicel. Tufts gen. not or loosely cohering when moist, brown when dry, often high. — Alp. rocks r. *Eur.* Norway!; Ryan, com. E. Nyman.

II. Eu-Grimmia.

1. Molliformes.

5. **G. mollis** Br. eur. — G. orthotrichoides Hartman.

Leaves crowded not carinate, oval-ovate or broadly ovate-oblong; those of stem gen. acute, those of branches obtuse; the acute leaves often furnished with a short hairpoint, the others muticous. Perichetial leaves short-acuminate often with longer hairpoint. Capsule smooth suboval not wholly exserted above perichetial leaves; lid short-apiculate; pedicel straight longer than capsule; calyptra cucullate. Tufts cohering and brown-green when dry, about 2 c. m. or lower. R. fruiting. — Moist alp. rocks r. *Eur.* Norway: Hj. Holmgren, detector of this species. Sweden: E. Nyman. France: Husnot. *Amer.* Greenl.: Berggren.

* **G. submersa** Kindb. n. subsp.

Leaves obtuse muticous decurrent loosely disposed; the perichetial obtuse or subacute r. with short hyaline point. Capsule wholly exserted. Tufts dark green, less or not cohering. Stem 3—5 c. m. or much longer. Very r. fruiting. — Rocks in alp. rivulets r. *Eur.* Norway!; Kaurin.

2. Velutinæ.

6. **G. Manniæ** C. Mueller in Flora 1887.

Leaves broad-ovate subobtuse, carinate above, not recurved; cells subquadrate, the upper dusky; hairpoint sometimes present. Capsule suboval red-brown not striate; lid conic; pedicel arcuate or finally erect. Tufts dark green when dry, about 0,5 c. m. high. — *Amer.* r. U. S. Calif.: Mrs Mann, com. C. Mueller.

7. **G. velutina** Kindb. revue bryol. 1896. — »G. Manniæ» cat. Can. m.

Leaves as in the last but recurved all around and not carinate; cells subquadrate pellucid; hairpoint r. present. Tufts brown and velvetlike when dry, low as in the last but more compact. Capsules unknown. — Dry rocks r. *Amer.* Can. Brit. Col.: Macoun.

3. Pulvinatæ.

A. Leaves carinate above. Pedicel of capsule arcuate when young and moist. Us. monoecious.

8.**G.pulvinata** L. — Bryum L.; Grimmia Smith.

Leaves gen. ovate-oblong, more or less recurved below. Capsule emergent brown striate either oval-oblong rostellate or broad-oval with mamillate lid; calyptra mitriform. Tufts 1—2 c. m. high. — Rocks and stone-walls in lower districts. *Eur.* not uncommon. Sweden, Germany, Switzerl.! Greece: Heldreich. *Amer.* Can.: Macoun.

* **G.Philiberti** Britton in Torr. bot. club XVIII, 2.

»Leaves narrower, recurved all around, often with propagula; basal cells rectangular. Capsule smooth; lid rostellate. Dioecious. — *Amer.* r. Idaho: Leiberg»: Britton l. c.

9.**G.orbicularis** Bruch.

Lower leaves ovate-oblong, the upper ovate-lanceolate not recurved at one side. Capsule emergent brown suboval faintly striate; lid obtuse; calyptra cucullate. Tufts about 1 c. m. high. — On stone. *Eur.* princ. in southern distr., somewhat r. Germany: Schimper. France: Zetterstedt. Italy: Arcangeli. Engl.: Rogers.

B. Leaves neither carinate nor recurved. Capsule not striate; pedicel not arcuate when moist. Dioecious.

10.**G.campestris** Burchell. — G. leucophæa Greville.

Leaves broadly ovate-lanceolate obtuse concave; basal cells subquadrate; hairpoint nearly smooth and long. Capsule oval reddish brown scarcely emergent; lid short-apiculate; annulus revoluble; calyptra mitriform. Tufts about 1,5 c. m. high. — Siliceous rocks. *Eur.* not r. in lower districts. Sweden, Switzerl.! *Amer.* U. S.: Roell.

* **G.sarcocalyx** Kindb. cat. Canad. m.

Leaves with more distinctly denticulate hairpoint. Capsule broad-oval more emergent by the twice longer pedicel; lid obliquely rostellate. — Subalp. regions r. *Amer.* Can.: Macoun.

11.**G.tenella** C. Mueller.

Leaves ovate-lanceolate channelled; lowest basal cells short-rectangular; hairpoint short or none. Capsule oblong pale brown small; lid apiculate or rostellate; calyptra cucullate; pedicel curved when dry. Tufts about 1,5 c. m. high, blackish when dry. — Rocks in alp. region r. *Amer.* Can. Brit. Col.: Macoun. U. S.: Roell.

4. Alpestriformes.

A. Leaves distinctly sulcate, papillose above and carinate;

12.**G.cæspiticia** Bridel. — Dryptodon Brid.; Grimmia Juratzka. **G. sulcata Sauter.**

Leaves ovate-oblong obtuse, not recurved below, suberect when moistened; basal cells short; hairpoint very short us. wanting. Capsule oblong-cylindric chestnut-brown; lid conic; pedicel straight. Tufts olive-green 0,5—2 c. m. high, very dense. Dioecious. — Rocks and stone-walls r. *Eur.* Switzerl.! Austria: Schimper. France: Husnot.

* **G.arctica** C. Mueller.

»Leaves shorter, cucullate at apex. — *Amer.* Greenl.»; C. M. in Lange, Greenl. fl.

B. Leaves not or (sometimes in *G. alpestris*) faintly sulcate, smooth.

a. Leaves channelled, not recurved below. Capsule long-exserted. Us. dioecious.

13.**G.commutata** Huebener. — Dicranum ovatum Swartz; Grimmia Weber et Mohr.

Leaves ovate-lanceolate, flat or subinvolute above, patent when moist, the uppermost much larger; basal cells long, the upper short and opake; hairpoint rough not long, sometimes wanting. Capsule oval brown; lid rostellate; annulus broad; pedicel straight. Tufts very loose, grayish green above, brown or blackish below, 2—4 centim. high. Dioecious. — Rocks, gen. siliceous, princ. below alps. *Eur.* not r. Sweden, Norway, Switzerl.! *Amer.* Can. Brit. Col.: Macoun. U. S.: Roell.

14.**G.teretinervis** Limpricht.

Differs from the last: Leaves shorter, involute nearly all around, suberect when moist; nearly all cells short; hairpoint us. wanting. Tufts blackish. Stem often with brood-corpuscles. Capsules unknown. — Calcareous rocks r. *Eur.* Switzerl.! Austria: Gander. Greece: Haussknecht.

15.**G.arctophila** Kindb. rev. bryol. 1896.

Leaves ovate-oblong, involute above, suberect when moist, appressed when dry, the uppermost not larger; basal cells gen. short, the upper short opake; hairpoint not long. Capsule suboblong brownish; lid apiculate; annulus indistinct; pedicel straight. Tufts cohering us. blackish when dry, about 3 c. m. high. — *Amer.* r. Greenl.: Berggren. Can. Cypress hills: Macoun.

* **G.labradorica** Kindb. n. subsp.

Tufts about 1 c. m. high, brown-green. Inner (lower) basal leaf-cells long. Lid of capsule obliquely rostellate. — *Amer.* r. Can.: Northern Labrador: Macoun 1896.

16 **G.tenerrima** Renauld et Cardot. — G. nivalis Kindb. bull. Torr. club XVII.

Leaves very broad at base, broadly ovate-oblong, us. recurved in upper part, patent when moist, the uppermost not larger; basal cells short somewhat large, the upper short opake; hairpoint us. wanting, in perichetial leaves somewhat long. Capsule oblong-oval brownish; lid muticous or obliquely rostellate; annulus indistinct; pedicel us. curved when dry. Tufts us. cohering, blackish when dry, about 1 c. m. high. — Rocks in alp. region r. *Amer.* Pacif. distr. Can.: Macoun. U. S.: Roell; Henderson, com. Cardot.

b. Leaves carinate. Capsule us. not exserted above perichetial leaves.

17.**G.montana** Bryol. eur.

Leaves ovate-lanceolate, not recurved below, patent when moist; basal cells long; hairpoint long and rough. Capsule oval-oblong reddish brown; lid rostellate; annulus nearly indistinct; pedicel straight distinctly exserted above perichetial leaves. Tufts cohering us. green, about 1—2 c. m. high. Dioecious. — Rocks also below alps. *Eur.* not r. Sweden, Norway, Switzerl.! Germany: Schimper. *Amer.* r. Can., Brit. Col.: Macoun.

18.**G.alpestris** Schleicher.

Leaves broadly ovate-lanceolate or ovate-oblong, not recurved below, gen. patent when moist; basal cells short; hairpoint long nearly smooth. Capsule brown us. oblong-cylindric; lid muticous; annulus indistinct; pedicel straight. Tufts us. cohering, blackish or grayish green when dry, glaucous green when moist, about 1 c. m. high. Us. dioecious. — Alp. rocks. *Eur.* less r. Norway, Switzerl., Spain! *Amer.* r. Can.: Macoun.

* **G.Ungeri** Juratzka.

Capsule oval; lid apiculate. Monoecious. — *Eur.* r. Scotl.: Fergusson.

* **G.subsulcata** Limpricht.

Leaves faintly sulcate. Capsule pale brown; pedicel sometimes curved (in Austrian specimens straight). Often monoecious. »Capsule with large stomata»: Limpricht. — Alp. region r. *Eur.* Switzerl.! Austria: Gander.

19.G.subsquarrosa Wilson; Braithwaite. — »G. Muehlenbeckii var.» Limpricht.

Leaves ovate-lanceolate recurved below at both sides, spreading when moist; inner basal cells quadrate, the alar rectangular; hairpoint long rough. Capsules unknown. Tufts fuscous-green above, 1—3 c. m. high. Stem with brood-corpuscles. — Rocks r. *Eur.* Engl.: H. Boswell. Belgium: Gravet.

5. Andreæoideæ.

20.G.(?) andreæoides Limpricht.

»Leaves obtuse muticous concave not carinate and not recurved, appressed when dry; the uppermost suddenly larger from ovate-oblong base gradually acuminate; the lower and those of shoots ovate-oblong very small; upper cells round-oval, lower gen. rectangular; costa with brood-corpuscles. Capsules unknown. Tufts reddish or blackish brown. Stem 1,5 c. m. high or lower with numerous shoots. Allied to *G. torquata*, but leaves not are twisted. — Rocks in alp. region r. *Eur.* Austria: Breidler»: Limpricht.

III. Pseudo-Racomitrium Kindb.

1. Papillosæ.

21.G.elatior Bruch.

Leaves ovate-lanceolate acute, recurved below to middle on both sides; middle cells subquadrate or short-rectangular; alar cells rectangular; costa papillose; hairpoint nearly smooth often long. Capsule oval sulcate or costate; lid rostrate; pedicel often not emergent above perichetial leaves. Plants robust often high. Tufts loose, blackish below, fuscous green above. — Rocks princ. below alps. *Eur.* not r. Sweden, Switzerl.! Norway: M. N. Blytt. *Amer.* »Greenl.: Vahl»: Lange.

*** G.papillosa** Kindb. Laubm. Schw. u. Norw. — G. elatior var. subfunalis Limpricht.

Leaves more distinctly papillose, less acute, more appressed when dry; hairpoint short or wanting. Tufts lower (about 3 c. m.) blackish green more dense. Capsules not found. — Alp. rocks r. *Eur.* Norway!

*** G.anomala** Hampe.

»Leaves subobtuse often with brood-corpuscles at apex; hairpoint short dentate or wanting. — Alp. rocks r. *Eur.* Austria and Switzerl.»: Limpricht.

22.G.Lisæ Notaris.

Leaves ovate-lanceolate acute, not distinctly recurved below at one side, subfalcate when moistened; nearly all cells rectangular, alar not hyaline; hairpoint rough often short. Capsule oblong nearly smooth. Stem about 2 c. m. high. Habit of *G. trichophylla.* — Rocks r. *Eur.* Switzerl.! Belgium: Gravet. Italy: Venturi. *Amer.* Can. Rocky mts and Vanc. isl.: Macoun.

* **G.sardoa** Notaris; C. Mueller syn.

»Leaves curved at apex, revolute to above middle; lower cells short. Capsule globose. Plants small. — *Eur.* r. Italy: Notaris»: C. M.

2. Crispulæ.

23.**G.incurva** Schwægrichen. — Dicranum contortum Wahlenberg; Grimmia Schimper.

Leaves sublinear-subulate with thickened borders, gen. crisped; cells green or pale yellow: the middle oval-quadrate, the upper small dusky; basal cells large, the alar rectangular; hairpoint short or none. Capsule oval-oblong; annulus broad; pedicel deflexed. Tufts soft us. tomentose, green or blackish, often somewhat high. In open places the leaves not are distinctly crisped. — Rocks princ. in crevices in alp. region r. *Eur.* Norway, Switzerl.! Sweden: E. Adlerz; J. Persson (fruit.) Germany: Schimper. *Amer.* Can. Brit. Col.: Macoun. U. S. Oregon: Roell.

24.**G.hamulosa** Lesquereux.

Differs from the last: Leaves falcate muticous not thickened at borders; cells brown, the lower less elongate; costa brown, stouter and subexcurrent. Tufts loose blackish. »Capsule larger; annulus none»: Lesq. et Jam. — Higher alp. region r. *Amer.* U. S. Calif.: Bolænder, com. C. Mueller.

25.**G.atrata** Mielichhofer.

Leaves sublinear subobtuse with thickened borders, crisped when dry, patent-erect when moist; cells pale green in younger state: the middle short-rectangular, the upper round-quadrate sinuous, the alar subquadrate; costa very stout; hairpoint very short nearly smooth us. wanting. Capsule oblong-cylindric or oval; annulus broad; pedicel straight. Tufts very tomentose, blackish when dry, brown-green when moist, often high. — Alp. region princ. on copper-rusty rocks r. *Eur.* Norway, Spain! Austria: Schimper.

3. Trichophylloideæ.

A. Leaves narrow, not recurved below, nearly flat at borders. Tufts dense and cohering, about 1—2 centim. high. Capsule small not striate.

a. Capsule nearly immersed, scarcely emergent above perichetial leaves; calyptra cucullate. Dioecious.

26.**G.ortholoma** Kindb. revue bryol. 1896.

Leaves long, nearly appressed when dry; nearly all cells sinuous, middle rectangular; hairpoint long nearly smooth. Capsule very small; lid with short conic or oblique beak. Tufts 1—2 c. m. high. Leaves often with brown branched brood-filaments. — *Amer.* r. Can. Brit. Col.: Macoun.

b. Capsule distinctly emergent, yellowish; calyptra mitriform. Monoecious.

27.**G.apiculata** Hornschuch.

Leaves subobtuse; cells yellow in younger state: middle and upper short sinuous, alar rectangular; hairpoint short smooth. Capsule oval; lid apiculate or mamillate. Tufts about 1 c. m. high. Habit of *G. ovata.* — Alp. region r. *Eur.* Norway! Austria: Breidler.

28.**G.Holleri** Molendo.

Differs from the last: Leaves with longer hairpoint; nearly all cells narrow. Capsule oblong with wider mouth; lid with longer beak. Tufts about 2 c. m. high. — Higher alp. region r. *Eur.* Austria: Breidler.

29.**G.arenaria** Hampe. — G. curvula Br. et Schimp.

Leaves subacute very narrow sublinear; cells faintly sinuous nearly all short, the lowest rectangular; hairpoint long smooth. Capsule suboval; lid obtuse muticous. Tufts less than 1 centim. high. — Rocks and stone-walls also in alp. region r. *Eur.* Switzerl.! Belgium: Schimper.

B. Leaves more or less recurved. Stem often long.

a. Angular (alar) leaf-cells indistinct or uniseriate. Dioecious. Leaves with obsolete or wanting hairpoint.

30.**G.patens** Dickson. — Bryum Dicks.; Grimmia Br. eur.

Differs from other species in the at back bilamellate costa of leaves.

Leaves long, recurved below middle at both sides, nearly appressed when dry; nearly all cells us. sinuous, the middle and alar subquadrate or short-rectangular, the inner basal long. Capsule subovate pale brown not striate; lid rostrate. Tufts us. loose and green; stem 5—10 c. m. long, r. shorter. Resembles some species of *Racomitrium.* Not r. fruiting. — Moist quartzose rocks also below alps. *Eur.* not r. Sweden common, Norway, Switzerl., Spain! *Amer.* Can.: Drummond; Macoun.

***G.subsimplex** Kindb. bull. soc. bot. ital. 1895.

Stem nearly simple, 3—4 c. m. high. Leaves less appressed when dry, not recurved below at one side, sometimes with brood-corpuscles; upper cells not sinuous. Capsules unknown. Habit of *G. Hartmani*. — Siliceous alp. rocks r. *Eur.* Switzerl. near Goeschenen!

31.**G.robustifolia** Kindb. — Racomitrium Kindb. bull. Torr. club XVII; R. obscurum Kindb. in Macoun Canad. musci exsicc.

Leaves long, not recurved above at least at one side, faintly crisped and not appressed when dry; nearly all cells sinuous, the middle rectangular, the upper subquadrate. Capsule small oval, striate or plicate when dry; lid with very short oblique beak. Tufts 3—6 c. m. high, dark green, finally blackish brown. — Rocks in brooks of higher alp. region r. *Amer.* Pacif. distr. Can. 1800—2100 metr. a. s.: Macoun.

b. Angular (alar) leaf-cells pluriseriate and rectangular. Dioecious. Stem gen. not high.

32.**G.trichophylla** Greville.

Leaves long, not distinctly recurved below at one side; middle cells short-rectangular, the upper roundish-quadrate faintly sinuous; hairpoint nearly smooth often long. Capsule oblong costate or rugose. Stem us. 1 c. m. (in Canad. specimens often 2 c. m.) high. Tufts loose greenish. — Rocks. *Eur.* princ. below alps, not r. in southern districts. Switzerl.! Germany: Schimper. France: Husnot. *Amer.* Can. common in Pacif. distr.: Macoun. U. S.: Roell.

33.**G.Muehlenbeckii** Schimper.

Differs from the last: Leaves shorter and broader, nearly appressed when dry; upper cells distinctly sinuous; hairpoint longer and rough. Capsule oval gen. smooth. — Rocks princ. in northern districts. *Eur.* Sweden common, Norway, Switzerl.! *Amer.* r. Can.: Macoun.

34.**G.californica** Sullivant.

Leaves somewhat small, acute, recurved below at both sides, the upper with long faintly rough hairpoint; cells yellow: the middle and upper round quadrate very small, not or faintly sinuous; alar cells short-rectangular. Capsule oval faintly striate; teeth often subpartite. Tufts dense brown 2—3 centim. high. — *Amer.* r. Pacif. distr. Can.: Macoun. U. S.: Bolænder, com. C. Mueller.

* **G.Watsoni** Lesquereux et James.

»Leaves scarcely hair-pointed. Capsule oval-oblong. — *Amer.* U. S. Calif.»: Lesq. et J.

35.**G.depilata** Kindb. cat. Canad. m.

Leaves somewhat small, gen. obtuse and hairless, r. with obsolete hairpoint, recurved below at both sides; middle cells quadrate, the upper round-quadrate not sinuous. Capsule oval not sulcate, often with oblique beak. Tufts dense dark brown or dark green above, 3—4 c. m. high. — Not much distinct from the last, but approved by C. M. — Dry rocks r. *Amer.* Pacif. distr. Can. Vanc. isl.: Macoun. U. S.: Roell.

c. Angular leaf-cells pluriseriate quadrate. Stem gen. long. Plants robust. Tufts loose.

aa. Monoecious. Capsule costate. Stem about 3—4 c. m. long.

36.**G.decipiens** Schultz. — Trichostomum Schultz; Grimmia Lindb.; G. funalis Br. eur.

Leaves recurved below at both sides, more or less flexuous when dry, the uppermost very long; middle cells rectangular, the upper subquadrate distinctly sinuous; hairpoint us. long and rough. Capsule oval. Perichetial leaves subulate-acuminate. Tufts blackish below, yellowish green or brown above. — Siliceous rocks also below alps. *Eur.* Sweden, Switzerl.!

bb. Dioecious. Capsule not distinctly striate. Stem gen. very long.

37.**G.Hartmani** Schimper.

Leaves long, not distinctly recurved below at one side, more or less flexuous; middle and upper cells roundish-quadrate sinuous, nearly all basal short, the alar not hyaline; hairpoint short rough or wanting, often destructed by brood-corpuscles. Capsule oval. Tufts us. green and 5—10 c. m. high. Very r. fruiting. — Rocks often below alps. *Eur.* not r. Sweden common, Switzerl.! Corsica fruiting: Philibert.

38.**G.arcuatifolia** Kindb. bull. Torr. club XVI.

Leaves long, recurved below at both sides, distinctly falcate when moist, not flexuous when dry; middle cells rectangular, upper subquadrate not sinuous. Upper leaves gradually larger upwards; hairpoint short rough. Capsules unknown. Tufts dark green above, about 5 c. m. high. — Dry rocks r. *Amer.* Can., Vanc. isl.: Macoun.

39.**G.canadensis** Kindb. n. sp.

Leaves somewhat long, recurved below at both sides, flexuous when dry; middle cells rectangular, the upper subquadrate distinctly sinuous, the alar hyaline very numerous. Capsule small oval. Tufts yellowish or brownish green, 4—5 c. m. high. Branches curved. — *Amer.* r. Can. Vanc. isl.: Macoun.

40.**G.procera** Kindb. (in litt. ad Macoun 1892); revue bryol. 1896. — G. pachyphylla Leiberg bull. Torr. club 1893 ?

Leaves long, recurved nearly all around, nearly appressed when dry; cells yellow, the upper short and not or faintly sinuous, the alar few, the inner basal long; hairpoint short and rough, sometimes wanting. Tufts brownish. Stem 5—10 c. m. long. Habit of *G. patens.* — *Amer.* r. Can. Vanc. isl.: Macoun. (U. S.: Leiberg ?)

4. Ovatæformes.

A. Tufts cohering, us. pulvinate. Stem 1—2 c. m. high. Gen. monoecious, us. fruiting.

41.**G.ovata** Weber et Mohr. — G. ovalis Lindb.

Lower leaves small, the upper ovate-lanceolate, recurved below at one side, nearly appressed when dry; middle and upper cells short indistinctly sinuous, the alar quadrate or short-rectangular; hairpoint us. long and nearly smooth, sometimes wanting. Capsule brown oblong-oval; lid rostellate; annulus deciduous; calyptra us. mitriform. Tufts us. greenish. Monoecious. — Rocks also below alps. *Eur.* common in northern districts. Sweden, Norway, Switzerl.! *Amer.* Can.: Macoun.

* **G.Hausmanni** Notaris.

»Leaves muticous. Capsule with apiculate or obtuse lid. Tufts brown-green. — *Eur.* Austria»: Limpricht.

42.**G.sessitana** Notaris.

Differs from *G. ovata*: Leaves nearly uniform; hairpoint short. Capsule pale-brown; pedicel less elongate; lid not rostellate; annulus indistinct; calyptra cucullate. Tufts blackish. Dioecious. — Rocks also below alps r. *Eur.* Norway, Switzerl.! Italy: Levier.

43.**G.Donii** Smith.

Leaves not long, not recurved at base; upper cells subquadrate sinuous, middle short-rectangular, the alar and the very narrow (inner) basal longer; hairpoint long nearly smooth. Capsule oval pale-yellow; lid mamillate; calyptra us. mitriform; pedicel not or scarcely emergent above perichetial leaves. Tufts small dusky or blackish green, us. about 1 c. m. high or lower. Monoecious. — Alp. regions. *Eur.* gen. r. Norway! *Amer.* r. Can.: Macoun.

44.**G.microtricha** C. M. et Kindb. l. c.

Differs from the last: Leaves with short hairpoint and shorter, less distinctly sinuous cells. Capsule oblong brown; lid short-conic; pedicel distinctly exserted. Dioecious or (on distinct branches) monoecious. Tufts blackish below. — Subalp. region r. *Amer.* Can. Brit. Col.: Macoun.

B. Tufts not or loosely cohering, 3—8 c. m. high. Gen. dioecious r. fruiting.

a. Leaves sublinear subobtuse, appressed when dry; lower cells not sinuous; hairpoint us. indistinct.

45.**G.elongata** Kaulfuss.

Leaves somewhat short and short-acuminate, faintly recurved below at one side; cells yellow in younger state: upper round-quadrate sinuous, middle and alar short-rectangular; hairpoint short often wanting. Capsule oval pale brown; lid short-conic obtuse. Tufts blackish when dry, brown-green when moist, somewhat low and more cohering in fruiting state. — Alp. region r. *Eur.* Norway! Austria: Venturi. *Amer.* Can.: Macoun.

b. Leaves ovate-lanceolate acute, nearly appressed when dry; nearly all cells (exc. at base near costa) sinuous. Upper leaves with short hairpoint.

46.**G.microcarpa** Gmelin. — Bryum Gm.; Grimmia Lindb.; Racomitrium sudeticum Br. eur.

Leaves more or less recurved below; upper and middle cells short, the alar uniseriate quadrate more dilated. Capsule suboval small; lid rostrate. Perichetial leaves with sublinear acumen. Tufts blackish or dark brown when dry. — Moist alp. rocks gen. r. *Eur.* Norway, Spain! *Amer.* Can. Brit. Col.: Macoun.

47.**G.attenuata** C. M. et Kindb. — Racomitrium C. M. et Kindb. l. c.

Leaves recurved nearly all around, suberect and nearly straight when moist; upper cells short, the middle rectangular, the alar long narrow often pluriseriate. Capsule suboval; lid subobtuse or apiculate. Tufts fuscous green above, blackish below. Habit of *G. elatior.* — Alp. region r. *Amer.* Can. Brit Col.: Macoun.

c. Leaves sublinear acute appressed when dry; lower basal cells not sinuous; hairpoint of upper leaves long. Dioecious. Capsules unknown.

48.**G.Stirtoni** Schimper; Braithwaite.

Leaves not recurved; lower basal cells rectangular, the others small subquadrate. — Rocks r. *Eur.* »Scotl.»: Braithwaite.

5. Unicoloriformes.

A. Lower leaf-cells very sinuous.

49.**G.elliptica** Turner. — Dicranum Turn.; Grimmia Arnott; Racomitrium Br. eur.

Leaves broadly ovate-lanceolate obtuse muticous, nearly appressed when dry; lower cells narrow, upper small dusky. Capsule broad-oval; lid long-rostrate; calyptra mitriform; pedicel straight. Tufts loose blackish when dry, not high. — Damp schistose rocks princ. near Atlantic sea r. *Eur.* Norway: R. Hartman; F. Kiær; E. Nyman.

B. Lower leaf-cells not sinuous.

a. Leaves obtuse muticous. Pedicel straight. Tufts loose.

50.**G.unicolor** Hooker.

Leaves often faintly crisped when dry; cells faintly sinuous, nearly all short yellow, uppermost opake very small. Capsule brown oval-oblong; lid rostellate; calyptra us. mitriform. Tufts about 4 c. m. or higher, blackish or brown-green when dry. R. fruiting. — Wet rocks often near cascades princ. in alps. *Eur.* less r. Norway, Switzerl.! *Amer.* r. Can.: Macoun.

b. Leaves acute with often long hairpoint. Pedicel arcuate. Tufts densely cohering.

51.**G.Olneyi** Sullivant icon. muscor.

Leaves appressed when dry, upper very long; cells greenish: inner basal rectangular, alar quadrate, middle less distinctly sinuous, upper opake very small. Capsule brown oval; lid rostrate; calyptra cucullate; pedicel short not emergent; annulus revoluble. Tufts 2—3 c. m. high us. grayish green. — *Amer.* r. Can.: Macoun. U. S.: Sullivant et Lesq., com. C. Mueller.

52.**G.Austini** Kindb. revue bryol. 1894.

Differs from the last: Leaves longer and subflexuous, less appressed when dry; middle cells distinctly sinuous. Pedicel longer; calyptra mitriform. — *Amer.* r. U. S. New Jersey: Austin, com. Macoun.

53.**G.fragilis** Schimper syn. ed. 2.

Leaves brittle nearly appressed; nearly all cells short: basal short-rectangular larger, alar rectangular hyaline, middle quadrate sinuous, upper opake very small; hairpoint rough, in uppermost leaves long. Capsule pale brown small oblong; lid obliquely rostellate; calyptra unknown; pedicel short but emergent. Tufts fuscous about 1 c. m. high. — Granitic blocks in subalp. region r. *Eur.* Portugal: E. Levier.

IV. Pseudo-Schistidium Kindb.

1. Piliferæ.

54.**G.pilifera** Palisot de Beauvois; C. M. — Weisia Roehling; Grimmia pennsylvanica Sulliv. icon. musc.

Leaves long ovate-lanceolate acute, not appressed but faintly flexuous when dry; upper cells subquadrate sinuous, the others rectangular exc. the subquadrate alar; hairpoint brown below, not long. Capsule oval; lid rostrate; calyptra mitriform; pedicel straight; annulus broad revoluble. Tufts loose brown about 2 c. m. high. — *Amer.* Can.: Drummond n. 56, com. Macoun. U. S.: Austin, com. Macoun; Sullivant, com. C. Mueller.

2. Crinitæ.

A. Annulus of capsule broad revoluble; peristome present.

a. Leaves short obtusate obtuse concave; cells sinuous. Capsule red-brown, rugose when dry; pedicel curved; calyptra cucullate. Monoecious.

55.**G.crinita** Bridel.

Leaves not thickened at borders: lower sublong, upper obovate-oblong larger; upper cells quadrate, middle short-rectangular, lower long hyaline; hairpoint long. Capsule ovate; lid short-conic. Tufts grayish loosely cohering, 1 c. m. or lower. — Stone-walls. *Eur.* princ. in southern districts. Switzerl.! France: Zetterstedt. Austria: Schmidt.

b. Leaves somewhat long-acuminate acute carinate above; cells sinuous. Capsule pale yellow not rugose; pedicel straight; calyptra mitriform. Monoecious.

56.**G.triformis** Carestia et Notaris.

Lower leaves small; upper larger and broadly ovate-lanceolate, not appressed when dry, us. curved when moistened; cells yellowish small quadrate exc. the rectangular lower basal, alar hyaline numerous; hairpoint nearly smooth, in upper leaves long. Capsule subglobose-cyathiform; lid convex mamillate. Tufts green 1—2 c. m. high. — In alps r. *Eur.* Switzerl.! Italy: Carestia, com. Geheeb.

57.**G.Ganderi** Limpricht.

Differs from the last: Leaves longer acuminate, not curved when moistened; upper cells oval-oblong; hairpoint long. Lid of capsule short-conic. — Schistose alp. rocks r. — *Eur.* Austria: Gander, com. E. Adlerz.

c. Leaves gen. long-acuminate, sometimes papillose near apex; cells not sinuous. Pedicel of capsule straight. Dioecious.

58. **G. tergestina** Tommasini.

Leaves with thickened borders, ovate-lanceolate somewhat large: upper with long faintly denticulate hairpoint; basal cells narrow-rectangular, the others short; costa not dilated above. Capsule brown suboval; lid rostellate. Tufts pulvinate often 2—3 c. m. high, grayish when dry. — Calcareous rocks and stones r. *Eur.* southern distr. Switzerl.! Austria: Schimper; Roell. Italy: Bottini. France: Philibert.

B. Leaves smooth gen. obtusate: lower obtuse muticous. Pedicel of capsule curved; annulus narrow persistent. Monoecious.

a. Peristome present.

59. **G. plagiopodia** Hedwig.

Upper leaves oblong with nearly smooth not long hairpoint; cells not sinuous, gen. short, basal larger. Capsule pale brown subglobose or broad-oval; lid nearly flat or subconvex, mamillate or apiculate; teeth orange. Tufts green or brown-green not cohering, scarcely 1 c. m. high. — Dry rocks princ. of sandstone. *Eur.* less r. in southern distr. Germany: Schimper; Schulze. France: Husnot m. gall. *Amer.* r. Can.: Macoun.

* **G. Brandegei** Austin.

Perichetial leaves hyaline above often to middle; hairpoint rough very long. Capsule subglobose; pedicel very short. — *Amer.* r. Can.: Macoun.

b. Peristome us. wanting.

60. **G. anodon** Bryol. eur.

Upper leaves narrowly ovate-oblong acute with long nearly smooth hairpoint; cells not sinuous: basal narrow-rectangular, the others short; costa broader above. Capsule red-yellow broad-oval, finally subpomiform; lid low subconvex mamillate or apiculate; peristome none. Perichetial leaves larger and longer; basal cells very long. Tufts not or loosely cohering grayish green about 1 c. m. high. — Dry rocks also in alps. *Eur.* less r. Norway! Germany: Schimper. Austria: Venturi. *Amer.* r. Can.: Macoun.

61. **G. alpina** Kindb. enum. bryin. dovr.; revue bryol. 1896. — »G. plagiopodia»: Zetterstedt; »G. anodon»: Limpricht; G. Limprichtii Kern.

Differs from the last: Leaves broader, ovate or broadly ovate-oblong obtuse without hairpoint; cells often sinuous gen. subquadrate. Lid of capsule convex neither apiculate nor mamillate; teeth sometimes rudimentary. Perichetial leaves with somewhat long hairpoint; basal cells short- rectangular. Tufts cohering brown-green about 2 c. m. high. — Rocks in higher subalp. region r. *Eur.* Norway in Dovrefjeld! Austria: Kern.

V. Schistidium Bridel.

1. Platyphylloideæ.

A. Leaves not appressed when dry; hairpoint wanting.

a. Leaves denticulate near the obtuse apex, broadly acuminate.

62.**G.rivularis** Bridel.

Leaves large ovate-lanceolate; cells large. Perichetial leaves broadly obtusate; costa abbreviate. Capsule obovate finally turbinate; teeth red, larger than in *G. apocarpa*; lid short-pointed; calyptra cucullate. Tufts loose. Stem decumbent, 3—6 c. m. or longer. — Stones in water not common. *Eur.* Finl.: Brotherus. France: Husnot. *Amer.* Can.: Macoun.

b. Leaves entire nearly subulate.

63.**G.maritima** Turner.

Leaves ovate-lanceolate recurved crowded us. crisped when dry; the upper with us. excurrent costa. Capsule as in the last; teeth orange; lid rostellate; calyptra us. cucullate. Tufts dense pulvinate 1—2 c. m. high. — Rocks near sea or larger lakes. *Eur.* not r. Sweden! Ireland: Schimper. France: Le Jolis. *Amer.* Can.: Macoun; Roell; Waghorne.

* **G.Agassizii** Sulliv. et Lesq. — Schistidium S. L.; Grimmia **Lq. et J.; G. crassinervis C. M.**

Leaves less crisped; costa not or indistinctly excurrent. Lid of capsule sometimes with shorter point. — *Amer.* Can.: J. Macoun; Waghorne. Alaska: J. M. Macoun.

64.**G.cinclidodontea** C. Mueller.

Leaves narrowly ovate-lanceolate not recurved, loosely disposed, falcate when moistened; costa long-excurrent. »Capsule subglobose; teeth red; lid rostellate; calyptra mitriform»: C. M. Tufts not cohering; stem about 4—5 c. m. long. — *Amer.* r. Pacif. distr. U. S.: Roell, com. C. Mueller.

B. Leaves entire nearly or completely appressed when dry, often with hairpoint. Stem erect.

a. Stem-leaves short obtuse ovate or ovate-oblong.

65.**G.platyphylla** Mitten.

Leaves subovate muticous more or less recurved and not large, appressed when dry, not curved when moistened; perichetial not much larger. Capsule subglobose; teeth red; lid short-pointed or mamillate; calyptra cucullate. Tufts 1—3 c. m. high, somewhat loose us. green. — Alp. rivulets r. *Eur.* Norway! *Amer.* Can.: Macoun.

66.**G.brunnescens** Limpricht. — Schistidium Lpr.; Grimmia Kindb.

Leaves small ovate-oblong muticous or with short rough hairpoint, not recurved, nearly appressed when dry, curved when moistened; perichetial not much larger with longer hairpoint. Capsule subglobose or broad-oval; teeth orange; lid short-pointed; calyptra mitriform. Tufts dense 1—1,5 c. m. high. — Higher subalp. region r. *Eur.* Switzerl.!

b. Stem-leaves ovate-lanceolate. Tufts dense.

67.**G.flaccida** Notaris. — Anoectangium Not.; Grimmia Lindb.; G. sphærica Schimper; Gymnostomum pulvinatum Hoffmann 1796.

Leaves somewhat large acuminate, recurved only in middle, with nearly smooth often long hairpoint; perichetial larger and more recurved. Capsule subglobose finally turbinate; teeth orange often rudimentary or wanting; lid mamillate; calyptra mitriform. Tufts 0,5—1,5 c. m. high often green. — Rocks and stone-walls r. *Eur.* Switzerl., Italy! Austria: Breidler.

68.**G.alpicola** Swartz.

Leaves not large, broadly acuminate subobtuse and recurved, muticous or with indistinct hairpoint; perichetial not much larger. Capsule suboblong often nearly exserted; teeth red; lid short-pointed; calyptra cucullate. Tufts 1—5 c. m. high us. brown or brown-green. — Moist alp. rocks r. *Eur.* Switzerl., Norway! *Amer.* Can.: Macoun.

69.**G.heterophylla** Kindb. bull. Torr. club XVII. — G. coscinodontoides Kindb. l. c.; G. chloroblasta Kindb. cat. Canad. m.

Leaves small narrowly acuminate nearly subulate, not distinctly recurved, with an often long rough hairpoint; perichetial green larger and longer. Capsule oblong; teeth orange very cribrose. Tufts 1—1,5 c. m. high dark green or grayish when dry. — Alp. rocks r. *Amer.* Can. Brit. Col.: Macoun.

2. Apocarpæformes.

A. Leaves princ. the youngest serrulate above often to middle; cells sinuous; costa rough at back.

70.**G.gracilis** Schleicher.

Leaves not large, ovate-lanceolate broadly acuminate recurved, nearly appressed when dry, curved when moistened; perichetial larger; hairpoint rough often long. Capsule oblong; teeth ferruginous below, pale yellow above; lid rostellate; calyptra cucullate or mitriform. Tufts loose often pale brown. Stem 2—10 c. m. long, sometimes decumbent. — Rocks also in alps not r. *Eur.* Norway, Sweden, Switzerl.! France: Husnot m. gall. *Amer.* Can.: Drummond; Macoun; Waghorne. U. S.: Austin.

71.**G.pseudo-rivularis** Kindb. n. sp.

Differs from the last: Leaves larger and broader, narrowed to a short-subulate point, patent when dry; cells less sinuous; costa subexcurrent rough only in upper part. Capsule oval; teeth red; calyptra mitriform. Stem long decumbent. Tufts green. — *Amer.* r. Can.: Macoun.

* **G.lancifolia** Kindb. n. subsp. — G. coloradensis Austin ?

Leaves narrower and less acute sometimes with obsolete rough hairpoint; costa not excurrent. Stem not long. — Wet rocks r. *Amer.* Can.: Macoun.

B. Leaves entire or near apex faintly serrulate, us. curved when moistened; costa smooth or near apex faintly rough. Stem us. erect.

a. Leaves recurved, the perichetial much larger.

72.**G.apocarpa** L. — Bryum L.; Grimmia Hedwig.

Leaves broadly acuminate us. ovate-lanceolate and not appressed when dry, gen. with rough hairpoint; cells us. papillose and faintly sinuous. Capsule suboval; teeth red; lid rostellate; calyptra mitriform. Tufts us. loose. — Rocks also in alps common. *Eur.* Sweden, Norway, Switzerl.! *Amer.* Can.: Macoun; Waghorne.

* **G.pachyneurula** C. M. et Kindb. l. c.

Leaves small muticous; cells smooth thin-walled not sinuous. — *Amer.* Can. Brit. Col.: Macoun.

73.**G.pruinosa** Wilson. — G. ambigua Sulliv. icon. m.

Leaves small broadly ovate-lanceolate subobtuse muticous or with rough often short hairpoint, appressed when dry; cells sinuous. Capsule suboval; pedicel sometimes as long; teeth reddish or paler; lid short-pointed; calyptra cucullate. Tufts loose about 1 c. m. high. In alps r. *Eur.* Norway!; Bryhn. Sweden: E. Nyman. *Amer.* Can.: Macoun; Waghorne. U. S.: Fendler, com. C. Mueller.

74.**G.atrofusca** Schimper.

Leaves small short ovate or oval-oblong us. muticous, appressed when dry; cells not sinuous. Capsule suboval; teeth reddish orange short and not perfectly evolute; lid rostellate; calyptra mitriform. Tufts loosely cohering about 2 c. m. high, blackish when dry. — Higher alp. region princ. on summits r. *Eur.* Switzerl. 1700 metr. a. s.!

b. Leaves not recurved; the perichetial much larger.

75.**G.atricha** C. M. et Kindb. l. c.

Leaves small short ovate-oblong subobtuse muticous, appressed when dry. Capsule suboblong; teeth yellow or hyaline above, orange near base; lid rostrate. Tufts densely cohering about 1 c. m. high, dark green or fuscous when dry. — Alpine rocks r. *Amer.* Can. Brit. Col. 1250 metr. a. s.: Macoun.

c. Leaves recurved; the perichetial not much larger.

76.**G.conferta** Funck.

Leaves broadly ovate-lanceolate subacute smooth not large, often with rough hairpoint, us. appressed when dry; cells not distinctly sinuous. Capsule oblong-oval; teeeh orange; lid apiculate; calyptra mitriform. Tufts dense but loosely cohering, 1—2 c. m. high, fuscous when dry. — Rocks not common. *Eur.* Sweden!; Lindberg. Switzerl.! *Amer.* Can.: Macoun; Waghorne.

* **G.tenera** Zetterstedt.

Leaves very small sublinear nearly subulate, nearly spirally twisted when dry; cells smaller. Capsules unknown. — Arctic distr. r. Norway: J. E. Zetterstedt, com. C. J. E. Haglund; W. Baur.

103. **Racomitrium** Bridel.

A. Leaves with papillose hyaline hairpoint or acumen. Beak of calyptra rough above.

1. **Lanuginosa.** Leaves fimbriate at acumen; green cells smooth. Capsule longer than beak; pedicel rough.

2. **Canescentia.** Leaves serrulate at acumen; all cells us. with somewhat long papillæ. Capsule gen. not longer than beak; pedicel smooth.

B. Leaves hairless or with a serrulate not papillose hairpoint. Capsule gen. longer than beak; pedicel smooth. Beak of calyptra sometimes wholly rough (viz. in *R. fasciculare*).

3. **Papillosa.** Leaves with short papillæ, often hairless.

4. **Lævifolia.** Leaves smooth us. with long hairpoint.

1. Lanuginosa.

1.**R.hypnoides** L.; Willdenow. — Bryum L.; Trichostomum Willd.; Racomitrium Lindb.; R. lanuginosum Bridel.

Leaves long ovate-lanceolate recurved below; green cells gen. narrow, the alar rectangular; costa smooth. Pedicel short. Stem ramose often to 10 c. m. long. — Stone and stony ground also in alps, common in northern districts. *Eur.* Sweden, Norway! *Amer.* Can.: J. Macoun; Waghorne. Alaska: J. M. Macoun.

2. Canescentia.

2.**R.canescens** Weis. — Hypnum Weis; Racomitrium Brid.

Leaves from broad ovate-oblong base gen. abruptly tapering to a subacute acumen, recurved nearly all around; upper and alar cells subquadrate, the others rectangular; costa rough at back, us. abbreviate; hairpoint r. short or indistinct. Pedicel us. long. — Stone ground also in alps common. *Eur.* Sweden, Norway, Switzerl.! *Amer.* Can.: J. Macoun; Waghorne. Alaska: J. M. Macoun. U. S.: Roell.

* **R.subfasciculare** Kindb. n. subsp.

Leaves fainter papillose, muticous or with very short hairpoint. — Rocks princ. in alp. region r. *Eur.* Norway! Austria: Venturi.

* **R.muticum** Kindb. bull. Torr. club XVII.

Leaves fainter papillose muticous, finally yellowish brown; costa percurrent. — Alp. region r. *Amer.* Can. Brit. Col. 1950 metr. a. sea: Macoun.

3.**R.Panschii** C. Mueller. — Grimmia C. M.; Racomitrium Kindb.

Differs from *R. canescens:* Leaves subovate obtuse with very short acumen without hairpoint or only faintly hyaline at apex, faintly papillose. Tufts low blackish. Capsules unknown. — Stem without nodose branches. — Arctic district r. *Amer.* Greenl. isl. Sabine: Pansch, com. C. Mueller.

3. Papillosa.

A. Leaves very broadly acuminate or obtusate, arrounded at the us. dentate apex, short broad and channelled, without hairpoint; costa not percurrent. Stem without nodose branchlets.

4.**R.aciculare** L. — Bryum L.; Racomitrium Bridel.

Leaves us. green or blackish when dry; upper cells rotundate. Capsule suboval; teeth deeply cleft; pedicel somewhat long. — Wet stones also in alps. *Eur.* nearly common. Sweden, Switzerl., Spain! *Amer.* Can.: J. Macoun; Waghorne. Alaska: J. M. Macoun.

5.**R.Neevii** C. Mueller.

Leaves us. bright green also when dry; upper cells subquadrate. Capsule oval-oblong; pedicel short. — Wet rocks r. *Amer.* Can. princ. in Pacif. distr.: J. Macoun. Alaska: J. M. Macoun.

B. Leaves narrowly acuminate entire.

a. Capsule large subcylindric; pedicel about 2 c. m. long. Leaves long gradually acuminate acute or subacute carinate, often with hairpoint; costa gen. percurrent. Stem r. with short nodose branchlets.

6.**R.varium** Mitten. — R.oreganum Ren. et Card.

Leaves yellowish green recurved nearly all around, subacute at apex, not appressed when dry; cells also the upper rectangular; costa greenish; hairpoint not long. Peristomial teeth partite. Stem sometimes with short r. numerous branchlets. — Wet stones in woods r. *Amer.* Pacif. distr. Can.: Macoun. U. S.: Henderson, com. Cardot.

7.**R.speciosum** C. Mueller.

Leaves green recurved nearly all around, subacute at apex; upper cells gen. subquadrate, often greenish; hairpoint often long. Peristomial teeth partite. Stem without short branchlets; leaves more appressed than in the resembling last. — Rocks in woods r. *Amer.* Pacif. distr. Can.: Macoun; Roell, com. C. Mueller.

8.**R.Levieri** Kindb. n. sp.

Leaves dark green or finally blackish brown, acute at apex, not recurved above or at one side, appressed when dry; upper cells subquadrate, the lower rectangular; costa finally brown; hairpoint none. Perichetial leaves more or less acuminate; costa percurrent or slightly excurrent. Peristomial teeth deeply cleft not partite. Stem without short branchlets. Tufts blackish brown when dry. — Alp. granitic rocks r. *Eur.* Portugal: E. Levier.

b. Capsule small gen. suboval; pedicel about 1 c. m. or shorter. Leaves gen. without hairpoint us. carinate.

aa. Leaves not recurved above or at one side, obtuse or subobtuse at apex; upper cells subquadrate; hairpoint none or indistinct. Peristomial teeth deeply cleft not partite. Stem without nodose branchlets.

9.**R.protensum** Braun. — Trichostomum Braun; Racomitrium Huebener.

Leaves somewhat long and at apex obtuse, recurved below, appressed when dry; hairpoint none; costa finally brown not percurrent. Perichetial leaves short-acuminate; costa short. Capsule suboval exserted; pedicel 5—8 mm. long. Tufts dark green finally blackish brown. — Wet rocks. *Eur.* not r. Sweden, Switzerl.! Portugal: Levier. *Amer.* »Greenl.»: Lange.

10.**R.depressum** Lesquereux.

»Resembling the last. Leaves broadly ovate, lanceolate above, obtuse, sometimes slightly denticulate at apex; upper cells broadly ovate. Capsule subcylindric immersed on a very short pedicel. Stem very long. — *Amer.* r. U. S.: Calif.: Bolænder»: Lesq. et Jam.

11.**R.Macounii** Kindb. bull. Torr. club XVI.

Leaves long, subobtuse at apex, not recurved at base, crisped when dry; hairpoint none or indistinct; costa percurrent finally brown. Capsule suboval exserted; pedicel 0,5 c. m. long. Tufts finally rusty or reddish brown. – Rocks and boulders in alp. region r. *Amer.* Can. Brit. Col. 2100 metr. a. sea: J. Macoun.

bb. Leaves recurved nearly all around, long and acute; cells us. narrow. Peristomial teeth partite. Stem often with short nodose branchlets.

12.**R.fasciculare** Schrader. -- Bryum Schr.; Racomitrium Brid.

Leaves nearly subulate-acuminate carinate us. (at least the upper) greenish; cells narrow; costa subpercurrent; hairpoint none. Stem with numerous short branchlets, us. long. Pedicel about 1 c. m. or shorter. Calyptra with wholly rough beak. — Rocks also in alps. *Eur.* not uncommon. Sweden, Norway, Switzerl., Spain! *Amer.* Can.: J. Macoun; Waghorne. Alaska: J. M. Macoun.

13.**R.tenuinerve** Kindb. revue bryol. 1896.

Leaves longer subulate than in the last, carinate, yellowish green; cells narrow; costa faint vanishing far below apex; hairpoint none. Stem long sometimes without short branchlets. Pedicel 0,5 c. m. long. Calyptra not seen. — Rocks r. *Amer.* Pacif. distr. Can.: J. Macoun. Alaska: J. M. Macoun.

14.**R.Palmeri** Kindb. revue bryol. 1896.

Leaves longer subulate than in *R. fasciculare*, blackish when dry, the upper faintly crisped; cells narrow; costa percurrent or subexcurrent; hairpoint none. Tufts dense 2—3 c. m. high. Pedicel very short gen. immersed. Habit of *Grimmia microcarpa.* Arctic district r. *Amer.* Alaska: Palmer; J. M. Macoun.

15.**R.Jenseni** Kindb. l. c. — R. sudeticum var. papillosum Jensen.

Leaves small broadly ovate-lanceolate acute, blackish and appressed when dry; the upper with short hairpoint; upper cells short; costa brown percurrent papillose. Capsules unknown. Tufts dense and low. Habit of *Grimmia microcarpa.* — Arctic district r. *Amer.* Greenl.: P. Eberlin, com. C. Jensen.

16.**R.micropus** Kindb. cat. Canad. m. — R. heterostichum var. occidentale Renauld et Cardot.

Leaves long-acuminate greenish channelled with thick borders; cells yellow gen. narrow, the uppermost sometimes subquadrate; costa percurrent; hairpoint long. Capsule oblong cylindric with short oblique beak; pedicel about 0,5 c. m. long. Habit of *R. microcarpum.* — Granite rocks in alp. region r. *Amer.* Pacif. distr. Can. Brit. Col. 2000 metr. a. sea: Macoun. U. S.: Roell; Henderson, com. Cardot.

4. Lævifolia.

A. Leaves channelled, thickened at upper borders.

17.**R.affine** Schleicher. — Trichostomum Schl.; Racomitrium Lindb.

Leaves ovate-lanceolate recurved below; upper cells round-quadrate not or indistinctly sinuous; hairpoint short. Capsule suboblong; teeth partite; pedicel about 1 c. m. long. Tufts gen. not high and often dense. Stem often without short branchlets. — Siliceous rocks not common. *Eur.* Norway, Switzerl.! Sweden: Arnell. *Amer.* Can.: Macoun; Waghorne. U. S.: Roell.

* **R.obtusum** Smith. — Trichostomum Sm.; Racomitrium Lindb.

Leaves gen. obtuse without hairpoint. — *Eur.* Sweden: Arnell. Norway: Bryhn. *Amer.* Can.: Macoun.

B. Leaves carinate above with not thickened borders.

18.**R.heterostichum** Hedwig. — Trichostomum H.; Racomitrium Brid.

Leaves ovate-lanceolate acuminate recurved nearly all around; cells as in the last; hairpoint often long. Capsule oblong-cylindric often somewhat large; teeth partite; pedicel 1 c. m. or somewhat longer. Tufts us. grayish. Stem often with short branchlets. — Quartzose stone princ. below alps. *Eur.* common. Sweden, Norway, Switzerl.! *Amer.* Can.: J. Macoun. Alaska: J. M. Macoun. U. S.: Henderson, com. Cardot.

* **R.micropoides** Kindb. n. subsp.

Leaves pellucid with very short hairpoint; upper cells sometimes rectangular; alar cells hyaline. Capsule small scarcely shorter than pedicel. — Rocks in alp. region r. *Amer.* Pacif. distr. Can. Brit. Col.: Macoun. U. S.: Roell.

19.**R.microcarpum** Schrader. — Dicranum Schr.; Racomitrium Brid.

Leaves as in the last; cells narrow-rectangular distinctly sinuous. Capsule small gen. suboval; teeth partite; pedicel short.

Stem with short branchlets. Tufts us. green. — Dry rocks princ. in northern alps. *Eur.* Sweden common, Norway, Switzerl.! *Amer.* Can.: Drummond; Macoun; Waghorne.

104. **Campylostelium** Bryol. eur.

1.**C.saxicola** Weber et Mohr. — Dicranum W. M.; Campylostelium Br. eur.

Leaves from suboblong base tapering to the longer but not much narrower sublinear obtusate acumen, crisped when dry; lower basal cells large rectangular, the others small quadrate; costa narrow not excurrent. Capsule oblong-cylindric; teeth red-yellow long narrow; lid long-rostrate; calyptra lobate; pedicel yellow sometimes curved. Stem very short. Monoecious with yellow male flowers at base of stem. — Rocks princ. of sandstone, often together with *Brachydontium*, r. *Eur.* Engl. W. H. Pearson. *Amer.* Can.: Macoun.

* **C.strictum** Solms Laubach.

Pedicel finally red. »Sometimes synoecious»: Geheeb. Otherwise not differing. — *Eur.* r. Portugal: Newton, com. Le Jolis.

105. **Coscinodon** Sprengel.

A. Leaves more or less distinctly plicate above. Dioecious.

1.**C.cribrosus** Hedwig. — Grimmia H.; Coscinodon Spruce.

Leaves broadly ovate-lanceolate or from subovate concave base slightly tapering to the involute scarcely longer gen. obtuse acumen, not recurved; alar cells not defined, the other basal short-rectangular pellucid, the upper subquadrate somewhat dusky; costa not excurrent. Perichetial leaves very much larger, more plicate, shorter-acuminate; hairpoint long, at base very broad. Capsule half-emergent obovate finally inclined, orange not striate; teeth orange cribrose (perforated as a sieve as in the other species), deflexed or patent when dry. Tufts compact loosely cohering about 1 c. m. high. Habit of *Grimmia crinita.* — Schistose and siliceous rocks. *Eur.* not r. Norway, Switzerl.! *Amer.* r. Can.: Macoun.

* **C.humilis** Milde.

Leaves somewhat narrower r. or slightly plicate; hairpoint more rough. — Peristomial teeth sometimes less perforated. *Eur.* r. France, Switzerl.!

B. Leaves not plicate. Monoecious.

2.**C.Wrightii** Sullivant icon. muscor.

Leaves very concave from subovate base abruptly narrowed subobtusate, often crenulate above, sometimes reflexed below, appressed when dry, erect when moist; cells short-rectangular;

basal larger, apical hyaline; costa excurrent to a very long rough hairpoint. Perichetial leaves not larger. Capsule immersed suboval, truncate at base; pedicel shorter; teeth purplish. Stem very short. — Rocks r. *Amer.* »U. S. south. states»: Lesq. et Jam.

3.C.**Raui** Austin. — C. Renauldi Cardot.

Differs from the last: Leaves carinate narrower more distinctly acuminate not recurved, patent when moist, gen. entire with shorter hairpoint; costa gen. not excurrent. Capsule globose when young, finally oval; teeth sometimes cleft. — *Amer.* r. U. S.: Henry, com. Cardot.

4.C **calyptratus** Hooker. — Grimmia Hook.; Sull. icon. m.; Coscinodon C. Jensen (in litt.); Grimmia columbica Kindb. bull. Torr. club.

Leaves ovate-lanceolate channelled, recurved below; basal cells subquadrate much larger than the upper; hairpoint long rough; costa percurrent. Perichetial leaves sublinear much longer. Capsule not or scarcely emergent above the hairpoints, oblong-cylindric smooth or slightly striate yellow or orange-colored; lid rostrate or rostellate; annulus none; pedicel straight or r. curved, longer than capsule. Stem 2—3 c. m. long or shorter. Tufts dense glaucous green. — Dry alp. rocks. *Amer.* Can. Pacif. distr.: Macoun. U. S. Calif.: com. Macoun. (Mexico: Fendler, herb. Sulliv., com. C. Mueller).

106. **Brachystelium** Reichenbach; C. M.

A. Perichetial leaves not convolute. Peristomial teeth papillose indistinctly articulate not deflexed.

I. **Ptychomitrium.** Leaves plicate below, serrate above. Peristomial teeth us. subpartite. Plants somewhat robust. Habit of *Orthotrichum* (Ulota).

II. **Notarisia.** Leaves not plicate, entire or slightly sinuolate. Peristomial teeth often entire or irregularly cleft. Plants small. Habit of *Weisia.*

B. Perichetial leaves convolute. Peristomial teeth smooth articulate, deflexed when dry.

III. **Glyphomitrium.** Leaves entire not plicate. Plants small.

I. Ptychomitrium Bruch.

1.**B.polyphyllum** Dickson. — Bryum D.; Brachystelium Hornschuch.

Leaves from ovate-oblong subconcave broadly recurved base somewhat abruptly tapering to a long carinate nearly subulate acumen, incurved or nearly straight when moist; outer basal cells short-rectangular, the inner narrower, the alar brown; costa scarcely percurrent. Capsule oblong; teeth reddish below, yellowish in upper half; pedicel flexuous or arcuate when young and moistened; calyptra not long. Spores about 0,01 m. m. — Rocks and stonewalls. *Eur.* not r. in southern distr. France, Switzerl.! Norway: R. Hartman. Spain: Levier.

2.**B.Gardneri** Lesquereux. — Ptychomitrium Lq.; Brachystelium Kindb.

Differs from the last: Leaves wholly carinate gradually acuminate less distinctly plicate, falcate when moist; outer basal cells subquadrate. Capsule subcylindric; teeth blood-red; pedicel not flexuous. — Rocks r. *Amer.* Pacif. distr. Can.: Macoun. U. S.: Howell and Henderson, com. Cardot.

II. Notarisia Hampe.

3.**B.nigricans** Kunze. — Macromitrium Kunze; Brachystelium Kindb.

Leaves entire not involute, from short concave base contracted to the broad-subulate channelled or near apex carinate acumen, gen. acute; cells of acumen nearly opake, the marginal basal often subquadrate; other basal cells rectangular also pellucid, the inner not much narrower, the lowest larger often yellowish princ. the alar; costa distinct nearly to apex. Capsule oblong with indistinct neck; pedicel rigid. Spores 0,02 m. m. — Rocks r. *Eur.* Portugal: Solms Laubach, com. Nathorst (Teneriffa, com. Husnot).

* **B.Drummondii** Hooker et Wilson. — Grimmia H. W.; Brachystelium C. M.; Ptychomitrium Sull. ic. m.

Capsule oval. Leaves not reflexed at base, sometimes slightly sinuolate near apex. — Trees r. *Amer.* U. S. south. st.: Langlois, com. Cardot.

4.**B.incurvum** Schwægrichen. — Weisia Schw.; Brachystelium C. M.; Ptychomitrium Sull. ic. m.

Leaves entire, from short concave base contracted to the sublinear involute and at borders thickened acumen, gen. obtuse; cells of acumen opake, the lower basal rectangular hyaline; costa faint above. Capsule oval with short or indistinct neck; pedicel often curved when moistened. Spores about 0,01 m. m. Smaller than the last. — Rocks princ. of sandstone, r. *Amer.* U. S: Fitzgerald, com. Renauld. »Can.: Macoun»: Lesq. et Jam.

* **B.glyphomitrioides** Balsamo et Notaris. — Grimmia B. et N.; Brachysteleum C. M.; Ptychomitrium pusillum Br. eur.

Leaves more distinctly involute and subcucullate. Peristomial teeth often split. — Rocks r. *Eur*. Switzerl. near Lugano!

5.**B.pygmæum** Lesq. et Jam. — Ptychomitrium L. J.; Brachystelium Kindb.

»Leaves linear from ovate base; costa vanishing far below apex. Capsule oval; neck a third as long; teeth joined in pairs at base, sometimes connate their whole length; calyptra covering the capsule to its base. Plants very small. — On stones (?). *Amer*. U. S.: E. Hall»: Lesq. et Jam.

III. Glyphomitrium Bridel.

6.**B.Daviesii** Dickson. — Bryum Dicks.; Brachystelium Kindb.

Leaves narrow sublinear not or slightly reflexed below, from suboblong not well-defined base gradually tapering to a long subulate carinate acumen; nearly all cells quadrate not opake: only the lowest rectangular not much larger; costa percurrent. Perichetial leaves suboblong apiculate; costa subexcurrent. Capsule subglobose or obovate; neck nearly half as long; teeth broad; calyptra covering capsule; annulus none. Leaves sometimes with brood filaments. Spores 0,03—0,04 m. m. — Basaltic rocks r. *Eur*. Scotl.: Schimper. Engl.: W. H. Pearson. Irel.: Stewart, com. Le Jolis.

7.**B.canadense** Mitten. — Glyphomitrium M.; Brachystelium Kindb.

»Leaves lanceolate tapering to an acute or blunt point; borders recurved below to middle; basal cells oblong, the angular narrower. Perichetial leaves very broadly ovate. Capsule oval; pedicel shorter than in the last. — *Amer*. r. Can.: Drummond»: Lesq. et Jam.

107. **Drummondia** Hooker, musci amer. 1828.

1.**D.clavellata** Schwægrichen. — Macromitrium Schw.; Drummondia Hooker.

Leaves suboblong or broadly ovate-lanceolate, acute or very short-acuminate, carinate at least above, not distinctly involute; cells small rotundate, the few not well-defined alar subquadrate; costa not wholly percurrent. Perichetial leaves nearly similar but with short-rectangular cells at angles near base. Capsule subglobose-ovoid brown smooth; lid nearly flat, long-rostrate; annulus none; pedicel short. Calyptra long-rostrate reaching below the unripe capsule, finally concave and cucullate. Spores very large about 0,06 m. m. Tufts green or brown green. Dioecious. — On trees. *Amer*. Can. r.: Macoun. U. S.: Roell; Sullivant, com. C. M.; Fitzgerald, com. Renauld.

2.**D.canadensis** Kindb. revue bryol. 1896. — D. clavellata var. canadensis Kindb. cat. Canad. m.

Differs from the last: Leaves gen. subobtuse, channelled, distinctly involute at borders all around. Perichetial leaves broader, more obtuse; nearly all cells lax and long-rectangular. Capsule globose a little larger; lid short-rostrate. Tufts sometimes brown. Monoecious. Nearly allied to *D. obtusifolia* C. M. from Chili. — On trees r. *Amer.* Can. near lake Erie: Macoun.

108. **Scouleria** Hooker.

A. Leaves broad, thinly or indistinctly limbate only below. Peristome gen. persistent at least partly.

1.**S.aquatica** Hooker. — Grimmia Scouleri C. M.

Leaves ovate-lanceolate, broader at base, below middle tapering to the contracted broad point, sharply serrate to it from middle, blackish (or only the uppermost green) and strongly appressed when dry; marginant cells opake very distinct; other cells gen. dusky thick-walled, exc. few linear not porose inner basal. Inner perichetial leaves shorter and less dusky. Perigonial leaves short suboval very obtuse. — Wet rocks r. *Amer.* Can.: Macoun. U. S.: Henderson, com. Cardot.

2.**S Muelleri** Kindb. cat. Canad. m.

Leaves subelliptic, broader near middle, with very short arrounded broad point, sharply serrate from it to below middle, olive green and sometimes less strongly appressed when dry; cells subpellucid, the marginant pale orange not well-defined, the linear inner basal numerous porose. Inner perichetial leaves very pellucid from short dilated entire base tapering to a sublinear serrate acumen. — Wet rocks r. *Amer.* Can. Pacif. distr. Brit. Col. near Revelstok 1890 and Vanc. isl. 1893: Macoun.

* **S.catilliformis** C. Mueller.

Leaves nearly entire; marginant cells dusky. Capsules unknown. — *Amer.* r. U. S.: Roell, com. C. Mueller.

3.**S.Neevii** C. Mueller.

Differs from *S. Muelleri*: Leaves obtusely crenulate, patent when dry; upper cells dusky, the lower subpellucid, the marginant opake, the linear inner basal few not porose. Capsules unknown. — Wet rocks r. *Amer.* Pacif. distr. Can. Selkirk mts 1885 and 1890: Macoun. (Determined by C. M.)

B. Leaves narrow thickly limbate all around. Peristome very short and brittle soon deciduous or adhering to lid.

4.**S. marginata** Britton.

Leaves narrowly ovate-lanceolate channelled or faintly carinate above, serrate at the obtuse acumen, blackish and nearly appressed when dry; nearly all cells uniform subquadrate exc. the outer rectangular near borders; uppermost cells more opake. Perichetial leaves similar but longer acuminate. — Rocks above the water-line r. *Amer.* U. S. Calif.: Marshall A. Howe.

Fam. 24. Weisiaceæ.

109. Barbula Hedwig.

A. Basal tube of peristome elongate. Pedicel straight.

I. **Syntrichia.** Peristomial legs us. contorted.

1. **Ruraliformes.** Leaves us. lingulate-spathulate, with hairpoint (exc. *B. mutica*); basal cells us. long. Us. dioecious.

2. **Subulatæformes.** Leaves oblong-lanceolate or sublinear lingulate without hairpoint; basal cells long. Monoecious.

3. **Canescentes.** Leaves oval-ovate without hairpoint; basal cells short. Monoecious. Plants small and low.

B. Basal tube of peristome very short or indistinct.

a. Leaves mamillose. Peristome sometimes not contorted. Pedicel straight or curved.

II. **Timmiella.** Leaves long sublinear, often serrulate above, neither reflexed nor limbate, curled when dry; basal cells rectangular; costa r. excurrent. Capsule cylindric often large.

b. Leaves papillose. Peristome not contorted. Pedicel straight or curved.

III. **Zygotrichia.** Leaves ovate-oblong or ovate-lanceolate reflexed r. with hairpoint; basal cells large rectangular.

1. **Orthopodiæ.** Pedicel straight. Spores about 0,02 m. m. Leaves not limbate.

2. **Camptopodiæ.** Pedicel arcuate when moist. Spores about 0,04 m. m. Leaves broadly yellow-limbate.

c. Leaves papillose or smooth. Peristome us. contorted. Pedicel straight.

aa. Capsule placed on short lateral branches. Leaves broadly limbate below by narrow hyaline cells, serrulate above.

IV. **Pleurochæte.** Leaves not reflexed, curled when dry; costa not excurrent. Peristome much contorted. Dioecious.

bb. Capsule terminal. Leaves gen. entire r. denticulate, us. curled when dry.

V. **Tortella.** Leaves neither reflexed nor limbate, from dilated base gen. longly acuminate, without hairpoint; basal cells long hyaline ascending higher at margins than the others; costa us. excurrent.

VI. **Tortula.** Leaves sometimes reflexed or limbate, gen. sublingulate or sublinear, sometimes with hairpoint; basal cells not higher ascending at margins.

1. **Cuneifoliæ.** Leaves smooth not limbate without hairpoint, not or near base slightly reflexed; basal cells long. Stem longish. Spores about 0,015 m. m.

2. **Limbatæ.** Leaves papillose limbate (by several cell-rows, without hairpoint, not reflexed; basal cells long. Stem very short. Spores about 0,01 m. m.

3. **Muraliformes.** Leaves papillose reflexed to above middle, sometimes limbate by one cell-row, often with hairpoint; basal cells long. Spores about 0,01 m. m. Stem us. short.

4. **Unguiculatæ.** Leaves papillose not (or only by one cell-row) limbate, without hairpoint, not or only below the middle reflexed; basal cells sometimes short-rectangular. Spores about 0,01 m. m. Stem often long.

VII. **Eu-Barbula.** Leaves not limbate, without hairpoint, gen. from dilated base acuminate, us. reflexed and not large; cells small us. short, the basal not higher ascending. Capsule small us. oblong. Tufts us. dense.

1. **Platyneuron.** Leaves strongly revolute often nearly to costa, entire and us. spirally twisted about stem, small and us. brownish; costa thick. Perichetial leaves sometimes sheathing or subconvolute. Stem low. Dioecious.

2. **Streblotrichum.** Leaves not or not strongly revolute, not sheathing, r. denticulate. Perichetial leaves convolute. Pedicel often yellow.

3. **Leptobarbula.** Upper (also perichetial) leaves sheathing subconvolute not reflexed. Plants small. Dioecious.

4. **Pseudo-Didymodon.** Leaves gen. (not strongly) reflexed, r. denticulate; the perichetial not sheathing. Dioecious.

a. **Acutæformes.** Leaves (at least the perichetial) with long-excurrent costa.

b. **Purpureæformes.** Leaves neither crisped nor curved, small and us. red; costa gen. not excurrent.

c. **Fallaciformes.** Leaves curved us. crisped; costa not excurrent. Annulus of the capsule us. indistinct. Tufts greenish or rufescent.

d. **Vinealiformes.** Leaves curved and crisped; costa sometimes short-excurrent. Annulus revoluble gen. broad. Tufts greenish, rufescent or reddish.

I. Syntrichia C. Mueller.

1. Ruraliformes.

A. Leaves short not distinctly carinate; lower basal cells uniform hyaline (in *B. lævipila* the outer sometimes narrower and not hyaline); hairpoint often smooth, sometimes (in ***B. mutica***) wanting. Peristome contorted, longer than basal tube. Dioecious or (*B. alpina* and sometimes *B. lævipila*) monoecious. Stem not high.

a. Leaves muticous nearly flat, sometimes reflexed near base.

1.**B.mutica** Lindberg. — Tortula Lindb.; Barbula Kindb.; B. latifolia (Bruch) Br. eur.

Leaves subspathulate obtuse. Capsule large; teeth once or twice contorted. Tufts dusky green. Often with propagula (brood-corpuscles). Very r. fruiting. — On base of trees r. on stones. *Eur.* not r. in warmer districts. Germany! Sweden: Lindberg; S. Hardin. *Amer.* r. U. S. Oregon: Roell.

b. Leaves with hyaline us. short and smooth hairpoint, involute (at least when dry) above, flat below.

2 **B.papillosa** Wilson. — Tortula Wils.; Barbula C. M.

Leaves subspathulate or short-lingulate obtuse. Capsule very small; teeth faintly contorted. Tufts dusky or brownish green. Often with propagula. »Fruiting only in Australia»: Braithwaite. — On trees princ. in warmer distr. *Eur.* less r. Switzerl.!; Roell. Norway: E. Nyman. Sweden: Lindberg. France: Husnot. *Amer.* r. »U. S.»: Lesq. et Jam.

c. Leaves us. with hairpoint, not involute, reflexed below.

aa. Peristome not much contorted, much longer than tube.

3.**B.alpina** Br. eur.

Leaves oblong-lingulate sometimes subacute, reflexed below middle: the lower muticous; lower basal cells somewhat small and not much long; costa smooth reddish; hairpoint smooth red or hyaline gen. short. Tufts rusty red below. Monoecious. — Rocks princ. in alps r. *Eur.* Switzerl.! France: Philibert. Austria: Breidler. Sweden: A. Grape.

* **B.pagorum** Milde.

»Leaves not reflexed, often with propagula. Capsules unknown. — Stone-walls r. *Eur.* Austria: Milde»: Limpricht.

4.**B.brevipes** Lesquereux. — »B. alpina»: cat. Can. m.

Differs from *B. alpina*: Leaves nearly flat at borders, obtuse often emarginate; hairpoint longer, sometimes denticulate. Peristomial tube longer. Stem and pedicel very much shorter. Dioecious. — *Amer.* r. Can. Brit. Col.: Macoun.

5.**B.rotundo-emarginata** C. M. et Kindb. l. c.

Differs from *B. alpina:* Leaves subspathulate shorter and broadly emarginate, more reflexed to above middle; hairpoint hyaline denticulate longer. Capsules unknown. Dioecious. — Rocks r. *Amer.* Can. Brit. Col.: Macoun.

bb. Peristome several times contorted, not much longer than tube.

6.**B.lævipila** Bridel. — Tortula Brid.; Barbula Br. eur.

Leaves oblong-lingulate us. obtuse, nearly flat or slightly reflexed at base; lower cells sometimes diversiform; costa brown or green not denticulate but sometimes minutely papillose; hairpoint hyaline us. smooth. Capsule long cylindric. Tufts us. olive-green. Sometimes monoecious. — Trees princ. in warmer distr. *Eur.* not r. France, Switzerl., Italy! Sweden: S. Hardin. *Amer.* r. Can.: Roell.

7.**B.brachyangia** C. M. et Kindb. l. c.

Differs from the last: Leaves more reflexed; costa red rough; hairpoint pale red at least below, slightly denticulate above. Capsule short suboblong; peristome not seen. Tufts reddish brown. Dioecious. — *Amer.* r. Can. Anticosti: Macoun.

B. Leaves gen. long and distinctly carinate; hairpoint denticulate. Dioecious or (*B. Muelleri*) synoecious.

a. Leaves faintly carinate; basal cells somewhat short and wide nearly uniform, the outer often less pellucid and not much narrower. Synoecious or polygamous.

8.**B.Muelleri** Bruch. — B. princeps C. M.

Leaves long sublinear-lingulate obtuse, reflexed to above middle, not or slightly curved when moistened; costa red nearly smooth; hairpoint hyaline. Capsule large; teeth twice contorted. Tufts high, rusty red below. — On stone r. on trees, r. *Eur.* France: Philibert. Greece: Heldreich. Italy: Arcangeli. *Amer.* Pacif. distr. Can.: Macoun. U. S.: com. Cardot.

b. Leaves distinctly carinate; basal cells long uniform hyaline not porose. Dioecious.

9.**B.norvegica** F. Weber. — Syntrichia F. Web. 1804; Barbula Lindb.; B. aciphylla Br. eur. 1842.

Leaves long sublinear-lingulate more or less acuminate or acute; costa faintly rough; hairpoint red nearly smooth. — On stone in alps. *Eur.* not r. Norway, Switzerl., Spain! Sweden: Lindberg. *Amer.* r. Can.: Macoun.

10.**B.pseud-aciphylla** Kindb. in Hedwigia 1896 p. 63.

Leaves long sublinear-lingulate obtuse; costa very rough above; hairpoint red only at base or in upper half. Capsule narrower than in the last; peristome not seen. — Rocks in alp. region r. *Amer.* Brit. Col. and Rocky mts: Macoun. U. S.: Roell.

c. Leaves distinctly carinate; basal cells diversiform. Dioecious.

aa. Leaves large long narrow, reflexed nearly all around, us. curved when moistened.

11.**B.ruralis** L. — Bryum L; Barbula Hedwig.

Leaves broadly limbate below, very papillose, us. obtuse and sublinear-lingulate; outer basal cells (princ. in elder leaves) narrower and porose; costa red very rough above; hairpoint hyaline or only at base red. Peristome red twice contorted, gen. not shorter than tube. Tufts rusty red below. — Stones, sand, trees and roofs. *Eur.* common but in alp. regions r. Sweden, Switzerl.! *Amer.* Can. eastern districts: Macoun.

* **B.ruraliformis** Bescherelle.

Leaves gen. ovate-lanceolate acuminate or acute with defluent hairpoint. Tufts brown. — Sandy places r. *Eur.* Sweden! France: Le Jolis. *Amer.* »U. S.»: Cardot.

* **B.alaskana** Kindb. n. subsp.

Leaves long-attenuate subacute. Peristome faintly twisted shorter than tube. Tufts brown, green above. — *Amer.* r. Can.: J. Macoun. Alaska: J. M. Macoun.

* **B.rubicundula** Kindb. n. subsp.

Leaves shorter, all red; the lower with very short red point; costa less rough. Habit of *B. alpina.* — Calcareous rocks r. *Eur.* Sweden in island Oeland!

12.**B.megalocarpa** Kindb. bull. Torr. club.

Differs from *B. ruralis:* Leaves us. larger, often short-acuminate acute, less reflexed above; outer basal cells golden yellow and narrower than the inner; hairpoint often red in lower half. Capsule larger; peristome faintly contorted, shorter than tube. — Rocks r. *Amer.* Can. Brit. Col. and Cypress hills: Macoun. U. S.: Roell.

13.**B.submegalocarpa** Kindb. in Hedwigia 1896 p. 64.

Differs from *B. ruralis:* Leaves longer narrow and less reflexed above, from broader base attenuate or sublinear; outer basal cells golden yellow not porose; hairpoint often red in lower half. Peristome faintly contorted, shorter than tube. — Rocks r. *Amer.* Pacif. distr. Can. Brit. Col.: Macoun. U. S.: Roell.

14.**B.læviuscula** Kindb. cat. Canad. musci.

Leaves narrowly limbate below, sublinear-lingulate obtuse, nearly smooth at the borders, not much twisted when dry; the outer marginal cells in 1 or 2 rows hyaline, inner marginal in 2 or 3 rows yellow porose and longer; costa red-brown smooth or indistinctly papillose, more rough near apex; hairpoint gen. wanting, in uppermost leaves denticulate long hyaline or at base red. Capsule narrower than in *B. ruralis*; peristome pale red much contorted and very much longer than tube; pedicel very thin and not long. Tufts high brown. — Rocks r. *Amer.* Can. Rocky mts: Macoun.

bb. Leaves somewhat short and less reflexed, not or scarcely curved when moistened.

15.**B.montana** Esenbeck. — Syntrichia Es.; Barbula Kindb.; Syntrichia intermedia Brid.; Barbula Milde.

Leaves sublinear-lingulate broadly limbate below gen. reflexed to above middle; upper cells smaller than in *B. ruralis*; costa brown-red less rough; hairpoint of upper leaves us. very long denticulate or r. short. Peristome us. twice contorted. Tufts olive-green, lower than in *B. ruralis*. — Stones princ. calcareous. *Eur.* not r. Sweden, Switzerl.! Engl.: Rogers. Greece: Haussknecht. *Amer.* r. U. S.: Roell.

16.**B.pulvinata** Juratzka. — B. danica M. F. Lange; B. latoexcisa C. M. et Kindb. l. c.

Leaves somewhat small sublingulate narrowly limbate below by pale green cells, often nearly flat or slightly reflexed; costa nearly smooth us. brown; hairpoint thin faintly rough not long. Capsule somewhat small; teeth once contorted. Tufts brown-green us. not high. — On trees or r. on stones. — *Eur.* not r. Sweden, Norway, Switzerl.! *Amer.* r. Can.: Macoun; Roell.

* **B.papillinervis** C. M. et Kindb. l. c.

Upper leaves subacute; costa reddish more papillose. Capsule short suboblong. — *Amer.* r. Can.: Macoun; Waghorne.

* **B.leptotricha** C. M. et Kindb. l. c.

Leaves with nearly smooth hairpoint. — *Amer.* r. Can.: Macoun.

2. Subulatæformes.

A. Leaves us. not reflexed; costa smooth us. excurrent. Peristome shorter than tube.

17.**B.subulata** L. — Bryum L.; Barbula Beauvois.

Leaves suboblong-lingulate or sublanceolate often limbate us. obtusate papillose with yellowish point of costa. Capsule large. Tufts us. green. — On earth. *Eur.* common below alps. Sweden, France, Switzerl.! *Amer.* not r. Can.: Macoun.

* **B.angustata** Wilson. — Tortula Wils.; Barbula Schimper.

Leaves oblong-lanceolate acuminate acute; costa long-excurrent. — *Eur.* not common. Sweden, Switzerl.! *Amer.* Can.: Macoun.

18.**B.mucronifolia** Schwægrichen. — Tortula Schw.; Barbula Br. eur.

Leaves suboblong obtusate smooth not limbate, smaller than in *B. subulata*, sometimes with reddish point. Differs also in smaller capsule and shorter peristomial tube. — Alp. rocks. *Eur.* not r. Norway, Switzerl.! Austria: Venturi. *Amer.* r. Can.: Macoun; Fowler.

B. Leaves reflexed nearly all around; costa papillose gen. percurrent. Peristome longer than tube.

19.**B.inermis** Montagne. — Tortula Mont.; Barbula C. M.

Leaves oblong-lingulate papillose not limbate gen. subobtuse. Tufts brown-green. — Stone in warmer distr. r. *Eur.* Germany: Herpell. France: Husnot. Spain: Dieck, com. Roell. *Amer.* »U. S.»: Lesq. et Jam.

3. Canescentes.

20.**B.canescens** Bruch.

Leaves oval-ovate short-acuminate or subacute papillose not limbate, reflexed nearly all around; costa papillose long-excurrent. Capsule not large; teeth red twice contorted. — Earth on rocks r. *Eur.* in warmer distr. France: Husnot; Le Jolis. Germany: Herpell. Greece: Orphanides.

21.**B.Guepini** Schimper. — Desmatodon Br. eur.

Leaves subovate short-acuminate acute very small slightly reflexed below. Capsule smaller than in the last with larger spores and shorter peristomial tube; teeth half-twisted red or whitish. — Earth r. *Eur.* France: Bescherelle. *Amer.* »U. S.»: Lesq. et Jam.

II. Timmiella Notaris.

A. Leaves with not excurrent costa, often serrulate above.

22.**B.anomala** Br. eur. — Trichostomum Schimp.

Leaves large subacute. Capsule large long oblong-cylindric; teeth red once contorted; annulus narrow; pedicel red. Stem not high, nearly naked below. Tufts dusky or yellowish green. Monoecious or r. synoecious. — On earth and stone-walls r.

Eur. princ. in Mediterr. distr. Switzerl.! Austria: Venturi. Italy: E. Adlerz. Greece: Heldreich. *Amer.* Pacif. distr. Can.: Macoun.

23.**B.lusitanica** Bridel. — Tortula Brid.; Barbula Kindb.; Trichostomum Barbula Schwægrichen.

Leaves large acute or short-acuminate. Capsule as in the last; teeth red not or slightly twisted; annulus none; pedicel red, pale above. Paroecious or monoecious. Resembles the last. — On stones r. *Eur.* princ. in Mediterr. distr. Switzerl.! Portugal: Levier. France: Anthouard.

24.**B.flexiseta** Bruch. — Trichostomum Bruch; Barbula Kindb.; Trichostomum flexipes Br. eur; Husnot m. Gall.

Smaller than the both last. Leaves acute often short-acuminate. Capsule short oblong-cylindric; teeth pale yellow not twisted; annulus broad; pedicel pale above, often deflexed. Tufts low green. Dioecious. — On earth r.: *Eur.* »Portugal and Sardinia»: Schimper. *Amer.* »U. S.»: Lesq. et Jam.

B. Leaves with excurrent costa.

25.**B.vancouveriensis** Brotherus. — Timmiella Broth.; Barbula Kindb.; Trichostomum Kindb. cat. Can. m.

Leaves acute longer than in the last, denticulate to below middle. Capsule cylindric; teeth pale not twisted; annulus broad; pedicel yellowish flexuous. Tufts pale green about 3 c. m. high. Dioecious. — Earth r. *Amer.* Can. Vanc. isl.: Macoun; Roell, com. Brotherus.

III. Zygotrichia.

1. Orthopodiæ.

26.**B.latifolia** Hedwig. — Dicranum H.; Barbula Kindb.; Tortula Lindb.; Desmatodon Br. eur.

Leaves reflexed nearly all around, short-acuminate or subobtuse, sometimes with yellowish point; costa gen. not percurrent. Capsule us. erect suboblong, sometimes broader or narrower; teeth orange-red not or slightly twisted. — Earth in alp. regions. *Eur.* common. Norway, Switzerl.! *Amer.* not r. Alaska: J. M. Macoun. Can.: Macoun; Waghorne.

* **B.brevicaulis** Bridel. — Desmatodon Brid.; Barbula Kindb.

Capsule slightly inclined; lid often systylic. Stem short. *Eur.* Norway!

* **B.glacialis** Funck. — Desmatodon Funck; Barbula Kindb.

Leaves piliferous; costa abbreviate. Stem high. — *Eur.* Norway! France: Husnot. *Amer.* »Greenl.»: Berggren. »Rocky mts»: Lesq. et Jam.

27.**B.suberecta** Drummond. — Tortula Drum.; Barbula Kindb.; Desmatodon obliquus Br. eur.

Leaves not reflexed in upper third, gen. ovate-oblong acuminate acute; costa long-excurrent. Capsule subcylindric slightly inclined or erect; teeth nearly once or half-twisted pale red. Stem very short. — Rocks in alp. regions r. *Eur.* Norway! *Amer.* Can.: Macoun; Drummond 145.

2. Camptopodiæ.

28.**B.Laureri** Schultz. — Trichostomum Schz.; Barbula Kindb.; Tortula Lindb.; Desmatodon Br. et Sch.; Tortula bryoides Drummond.

Leaves oval-oblong or oblong-lingulate sometimes acute, subpellucid, reflexed all around; costa short-excurrent. Capsule oblong; teeth half-twisted. — Crevices of rocks in alp. regions r. *Eur.* Norway! *Amer.* Can.: Macoun; Drummond 135.

IV. Pleurochæte Lindberg.

29.**B.squarrosa** Bridel.

Leaves large ovate-lanceolate long-acuminate nearly subulate, squarrose when moist. Capsule subcylindric; pedicel long. Tufts eradiculose pale green or yellowish. Very r. fruiting. — Calcareous rocks princ. in warmer districts r. *Eur.* Switzerl.! Norway: Ryan. Greece: Heldreich. France: Husnot. *Amer.* »U. S.»: Lesq. et Jam.

V. Tortella C. Mueller.

A. Leaves rigid very brittle, the lower not crisped. Dioecious r. fruiting.

30.**B.fragilis** Drummond. — Didymodon Drum.; Barbula Wilson.

Leaves long long-acuminate nearly subulate; costa long-excurrent. Capsule subcylindric somewhat large; teeth red much contorted; pedicel long often very thin. Tufts yellowish green often high. — Wet earth princ. in alps. *Eur.* Sweden, Norway, Switzerl.! *Amer.* Can.: Macoun; Waghorne; Drummond 142.

31.**B.nitida** Lindberg. — Tortula Lindb.; Barbula Juratzka; Trichostomum Schimper.

Leaves sublinear short-acuminate acute shorter than in the last; costa short-excurrent. Capsule oblong-cylindric; teeth yellow rudimentary not twisted. Tufts yellowish or blackish brown below, often not high. — Princ. on calcareous rocks, r. *Eur.* Switzerl.! Engl.: Rogers. Irel.: Holt. Italy: Bottini. Belgium: Gravet. *Amer.* Can.: Macoun.

B. Leaves us. crisped and soft (in *B. tortuosa* sometimes brittle); costa short-excurrent. Dioecious or (*B. cæspitosa*) monoecious.

a. Lower leaves very small, the upper suddenly much larger. Peristome not or slightly twisted. Tufts low yellowish green.

32.**B.flavovirens** Bruch. — Trichostomum Bruch; Barbula Kindb.; Tortula Lindb.

Leaves shorter than in *B. tortuosa;* the upper from broader base sublinear short-acuminate gen. obtuse; costa subpercurrent. Capsule suboblong or subcylindric; teeth dark-red not twisted; pedicel red-yellow. — Calcareous rocks r. *Eur.* princ. in Mediterr. distr. France: Schimper. Italy: Arcangeli; Bottini. Engl.: Holt. *Amer.* »U. S.»: Lesq. et Jam.

* **B.viridiflava** Notaris. — Trichostomum Not.; Barbula Kindb.

Leaves shorter and not crisped; costa narrower and longer-excurrent. Capsule shorter; teeth orange. — *Eur.* r. Italy: Forsyth, com. Levier.

33.**B.inflexa** Bruch. — Trichostomum Bruch; Barbula Kindb.; Tortula Lindb.

Differs from the last: Upper leaves incurved at apex; costa excurrent to an hyaline point. Capsule suboblong; teeth red slightly twisted; pedicel yellow above. — Calcareous rocks r. *Eur.* Italy: Venturi.

b. Leaves gradually larger upwards. Peristome us. contorted.

34.**B.tortuosa** L. — Bryum L.; Barbula Weber et Mohr.

Leaves gen. long longly acuminate and nearly subulate, r. shorter and brittle; costa very short-excurrent. Capsule oblong-cylindric or subcylindric; teeth red us. several times contorted; pedicel yellow above. Tufts us. high and yellowish green. — Rocks princ. calcareous. *Eur.* common. Sweden, Norway, Switzerl.! *Amer.* not r. Can.: Macoun.

»Trichostomum Bambergeri Schimper. — Leaves brittle sublinear or the upper long-acuminate subulate, sometimes broader acuminate with some teeth and large hyaline cells at apex. Capsule oblong-cylindric; teeth red not twisted. Stone-walls r. *Eur.* Austria: Bamberger and Breidler»: Limpricht. — A doubtful species, »Didymodon mutabilis var.»: Venturi et Bottini.

35.**B.inclinata** Hedwig fil. — Tortula H. fil.; Barbula Schwægrichen.

Leaves shorter than in *B. tortuosa,* from broader base sublinear gen. obtusate or sometimes cucullate at apex. Capsule shorter, suboblong often curved; teeth red less contorted; pedicel yellow above. Tufts dense yellowish green or brown not high. — Calcareous earth. *Eur.* not r. Norway, Switzerl.! Greece: Heldreich. France: Boulay.

36.**B.inclinatula** C. M. et Kindb. l. c.

Leaves as in the last but nearly straight when moist and more involute above; the perichetial whitish much broder. Capsule narrow-cylindric not large, nearly straight; teeth much contorted. Tufts loosely cohering about 0,5 c. m. high. — Sandy soil in alps r. *Amer.* Can. Brit. Col.: Macoun.

37.**B.cæspitosa** Schwægrichen. — B. cirrata Bruch.

Differs from *B. tortuosa*: Monoecious. Leaves shorter, less narrowly or longly acuminate; their hyaline basal part often denticulate above; costa more distinctly excurrent. Capsule smaller; pedicel shorter and thinner, flexuous and yellow, finally reddish. Tufts low often not cohering. — On earth and at base of trees r. *Eur.* France! Spain: Dieck, com. Roell. *Amer.* Can.: Macoun. U. S.: Langlois, com. Cardot.

VI. Tortula Bridel, in part.

1. Cuneifoliæ.

38.**B.cuneifolia** Dickson. — Bryum Dicks.; Barbula Brid.

Leaves subovate-suboblong or suboval, obtuse or acute and not reflexed: the upper nearly crisped when dry; costa green excurrent to a smooth nearly hyaline often long point. Capsule suboblong; teeth dark purplish scarcely more than once contorted. Tufts green higher than in *B. muralis.* Monoecious. — Rocks in warmer districts r. *Eur.* Engl.: Curnow. France: Husnot. Greece: Heldreich. *Amer.* Can.: Macoun (»B. Vahlii» cat. Can. m.)

39.**B.subcuneifolia** Kindb. revue bryol. 1896.

Leaves suboval-ovate sometimes acute or apiculate, slightly reflexed below, larger than in the last and not crisped; costa not excurrent finally red-brown. Capsule as in the last; peristomial tube more prominent. Monoecious. — Arctic. Pacif. distr. r. *Amer.* Alaska: J. M. Macoun.

40.**B.Garberi** Lesq. et Jam. — Desmatodon L. J.; Barbula Kindb.

»Leaves oblong or lingulate-lanceolate obtuse inflexed above; cells scarcely papillose; costa percurrent. Capsule oblong-oval; teeth partite. Habit of *Trichostomum arenaceum.* Dioecious. — *Amer.* r. U. S.»: Lq. et Jam.

2. Limbatæ.

A. Leaves limbaty by yellow narrow-rectangular cells.

41. **B.marginata** Br. eur. — Tortula Spruce.

Leaves suboblong gen. acute; costa somewhat longly excurrent. Peristome once contorted. — Sandstone-walls and roadsides in warmer districts r. *Eur.* France: Philibert; Bouvet. Portugal: Levier. *Amer.* »U. S.»: Lesq. et Jam.

* **B.limbata** Lindberg. — Tortula Lindb.

»Leaves larger, broader limbate. — *Eur.* r. Italy: Rabenhorst»: Husnot muscol. Gall.

* **B.Egelingi** Schliephacke.

»Leaves smaller, not narrowed at base, broader limbate by larger cells. Capsule smaller. — *Amer.* r. U. S. Tennessee: Egeling»: C. M. in Flora 1887.

B. Leaves limbate by subquadrate us. hyaline cells.

42. **B.Solmsii** Schimper.

Leaves oval-oblong gen. obtuse; costa somewhat longly excurrent. Peristome twice contorted. — *Eur.* r. »Portugal: Solms Laubach»: Schimper (Madeira: Fritze, com. Levier.)

43. **B.Porteri** James. — Desmatodon Jam.; Barbula Kindb.

Leaves oblong-lanceolate short-acuminate acute, the lower with yellow marginal cells; costa percurrent. Peristome half-twisted. — Rocks r. *Amer.* Can.: Macoun.

* **B.subcarnifolia** C. M. et Kindb. l. c.

Leaves gen. oblong, less distinctly limbate above; costa sometimes short-excurrent. Peristome faintly twisted. — *Amer.* r. Can. Pelw. island: Macoun.

3. Muraliformes.

A. Leaves somewhat large. Tufts us. loose.

44. **B.muralis** L. — Bryum L.; Barbula Timm.

Leaves sublinear or oblong-lingulate obtuse, reflexed to the hairpoint, often limbate by one cell-row; upper cells opake; costa us. excurrent. Capsule oblong-cylindric; teeth reddish 2 or 3 times contorted; annulus double. Tufts us. glaucous green and very loose. Us. monoecious. — Stones, stone-walls and roofs. *Eur.* nearly common in lower districts. Sweden, Germany, Switzerl., Italy! *Amer.* r. »U. S.»: Lesq. et Jam.

* **B.æstiva** Schultz.

Leaves long lanceolate-lingulate subacuminate green; costa short-excurrent or subpercurrent. Peristome gen. once contorted. Us. dioecious. — *Eur.* not r. Sweden, Switzerl.!

***B.ticinensis** Kindb. revue bryol. 1892.

Leaves short oblong-lingulate or subspathulate brown-green; costa short-excurrent. Capsule oblong. Peristome gen. once contorted. — Schistose siliceous rocks. *Eur.* Switzerl. near Lugano!

B. Leaves small, less reflexed. Tufts densely cohering.

45.**B.obtusifolia** Schleicher. — Tortula Schl.; Barbula Schwægrichen; Desmatodon Jur.; D. flavicans Br. eur.

Leaves short oblong-lingulate obtuse not reflexed in upper third, smaller than in *B. muralis* and not limbate; upper cells opake; costa percurrent or very slightly excurrent. Capsule suboval or oblong; teeth short brown-red scarcely once contorted; tube sometimes well-distinct; annulus double. Tufts green somewhat dense. Us. monoecious. — Rocks in higher alp. region r. *Eur.* Switzerl. 1750 metr. a. sea! Italy: Philibert (*Asia,* Caucase: Brotherus). *Amer.* Can.: Drummond 115, com. Macoun.

46.**B.Bolænderi** Lesquereux. — B. carnifolia C. M. et Kindb. l. c.

Upper leaves lanceolate-lingulate obtuse or subacute, not reflexed in upper third, not limbate; upper cells subpellucid faintly papillose; costa not or slightly excurrent. Capsule suboblong; teeth once contorted; annulus simple persistent. Tufts dirty green. Dioecious. Resembles *B. muralis *æstiva.* — *Amer.* r. Can.: Macoun. U. S.: M. A. Howe, com. Cardot.

4. Unguiculatæ.

A. Annulus of capsule double. Leaves often limbate by one cell-row. Monoecious.

47.**B.Vahlii** Schultz. — Tortula Wilson; Braithwaite.

Upper leaves sublinear or oblong-lanceolate obtuse, slightly and partly or not reflexed, subpellucid faintly papillose above; costa long-excurrent. Capsule subcylindric; teeth twice contorted; tube distinct. Tufts yellowish green. Resembles *B. cuneifolia* and *B. muralis.* — Damp clay soil in warmer districts r. *Eur.* »Engl.»: Braithwaite. *Amer.* »U. S.»: Lesq. et Jam.

B. Annulus not distinct. Leaves not limbate. Dioecious.

a. Perichetial leaves not sheathing.

48.**B.unguiculata** Hudson. — Bryum Huds.; Barbula Hedwig.

Leaves obtusate at apex (obtuse or subacute) reflexed below middle, sublinear or subovate-oblong or broadly oblong-lanceolate, suberect when moist; upper cells opake; the basal narrow-rectangular; costa us. excurrent r. percurrent. Perichetial leaves acute; costa excurrent. Capsule oblong-cylindric; teeth much contorted. Tufts dirty green sometimes high. — Earth and stone. *Eur.* common. Sweden, Italy etc.! Greece: Heldreich. *Amer.* not r. Can.: Macoun; Waghorne. U. S.: Sullivant, com. C. M.

49.**B.Cruegeri** Sonder.

Differs from the last: Leaves patent when moist; basal cells short-rectangular; costa very slightly excurrent; only the innermost perichetial leaves acute and very short with not excurrent costa. — On earth r. *Amer.* U. S.: Langlois, com. Cardot (Cuba: Wright, herb. Sullivant, com. C. Mueller).

b. Perichetial leaves half-sheathing. All leaves obtuse; costa not excurrent.

50.**B.amplexa** Lesquereux.

Leaves short suboval or short-lingulate, reflexed near base; basal cells rectangular. Perichetial leaves longer. Capsule subcylindric; teeth once contorted. Stems very short not tufted. — *Amer.* r. U. S.: Bolænder, com. C. Mueller; Howe, com. Cardot. »Can.: Drummond»: Macoun.

VII. Eu-Barbula.

1. Platyneuron Kindb.

A. Leaves us. doubly revolute. Peristome us. contorted.

51.**B.Hornschuchii** Schultz.

Leaves ovate-lanceolate acuminate acute, revolute to apex and often nearly to the excurrent costa. Perichetial leaves larger, suboblong revolute not sheathing; costa long-excurrent. Capsule oblong-cylindric; teeth much contorted. — On earth r. *Eur.* Belgium: Roemer. France: Brébisson; Berthoumieu. Sweden: J. Persson.

52.**B.revoluta** Schrader. — Tortula Schrad.; Barbula Brid.

Leaves ovate-lanceolate acuminate subobtuse, revolute to apex and nearly to costa; prominent lamina very narrow; costa percurrent or slightly excurrent often broader above. Perichetial leaves half-sheathing subconvolute; costa not excurrent. Capsule oblong-oval; teeth nearly twice contorted. Tufts dense. — Princ. on calcareous stonewalls. *Eur.* in lower and warmer districts. France! Italy: E. Adlerz. Germany: Herpell. Spain: Levier.

* **B.obtusula** Lindberg.

Perichetial leaves more open. »Peristome slightly or not twisted»: Lindb. — *Eur.* r. Germany: Goll. »Sweden»: Lindb.

53.**B.platyneura** C. M. et Kindb. l. c.

Differs from *B. revoluta:* Leaves shorter, ovate-oblong acute; costa distinctly excurrent. Capsules unknown. — Rocks r. *Amer.* Can. Brit. Col.: Macoun.

54.**B.revolvens** Schimper. — Desmatodon Husnot m. G.

Leaves oval-oblong obtusate us. obtuse, revolute nearly to apex; prominent lamina somewhat broad; costa scarcely excurrent not broader above. Perichetial leaves sheathing not revolute. Capsule oblong; teeth once contorted. Tufts loose. — Stonewalls r. *Eur.* France: Philibert.

B. Leaves simply not spirally revolute. Peristome half-twisted.

55.**B.atrovirens** Smith. — Grimmia Sm.; Barbula Schimper; Desmatodon nervosus Br. eur.

Leaves oblong-linear or suboval obtusate, revolute nearly to apex; prominent lamina broad; costa broader above us short-excurrent. Perichetial leaves similar; the innermost one shorter, neither revolute not sheathing. Capsule suboval. Tufts loose. — On stone in warmer distr. r. — *Eur.* France: Le Jolis. *Amer.* »U. S.»: Lesq. et Jam.

56 **B.subtorquescens** C. M. et Kindb. l. c.

Differs from the last: Leaves less opake and more obtuse not revolute near apex; prominent lamina broader; costa gen. percurrent not broader above. Capsule cylindric. Tufts somewhat higher, very compact. — Rocks r. *Amer.* Can Gaspe coast and Assa: Macoun.

2. Streblotrichum Palisot de Beauvois.

A. Pedicel yellow. Spores small. Dioecious.

a. Peristome much contorted; annulus revoluble. Leaves papillose entire narrow, crisped; basal cells short-rectangular hyaline; costa not excurrent. Tufts us. low.

57.**B.convoluta** Hedwig. — B. Closteri Austin ?

Leaves sublinear or oblong-lanceolate obtusate gen. not reflexed: perichetial nearly nerveless with short point. Capsule oblong; lid shorter. — On earth. *Eur.* common below alp. regions. Sweden, Norway, Switzerl.! *Amer.* Can.: Macoun.

* **B.commutata** Juratzka. — Trichostomum undatum Schimper.

Stem higher. Leaves narrow-lanceolate much longer: perichetial broadly acuminate. Capsule larger. — Wet calcareous rocks also in alps r. *Eur.* Switzerl.! Engl.: Burgess. Belgium: Roemer.

58.**B.chrysopoda** C. M. et Kindb. l. c.

Differs from *B. convoluta*: Leaves gen. obtuse: perichetial much broader, truncate or broadly arrounded at apex. Capsule shorter than lid. — On earth r. *Amer.* Pacif. distr. Can. Brit. Col.: Macoun; Vanc. isl.: Macoun; Roell.

59.**B.flavipes** Bryol. eur.

Leaves ovate-lanceolate acuminate acute reflexed nearly all around: perichetial subulate-acuminate. Capsule ovate-oblong; lid much shorter. — Calcareous places in alps r. *Eur.* Switzerl.! Austria: Breidler.

b. Peristome not twisted; annulus revoluble. Leaves mamillose not crisped; cells gen. subquadrate: lower basal rectangular; costa long-excurrent. Tufts to 2 c. m. high.

60.**B.chloropus** Bridel. — Ceratodon Brid.; Barbula Kindb.

Lower leaves subovate; the upper ovate-lanceolate attenuate not reflexed. Perichetial leaves convolute with subulate point. Capsule erect suboblong striate when dry; lid shorter; teeth reddish yellow. Tufts dense. — On earth r. *Eur.* France: Schimper; Philibert.

B. Pedicel red.

a. Leaves entire reflexed nearly all around. Stem very short.

61.**B.helvetica** Kindb. bull. Soc. botan. ital. 1895.

Leaves smooth ovate-oblong or broadly ovate-lanceolate acuminate acute; cells subquadrate subhyaline; costa percurrent or slightly excurrent. Inner perichetial leaves convolute obtuse or with short obtusate point; costa faint not percurrent. Capsule not seen; pedicel red. Dioecious. — *Eur.* Switzerl.: L. Mari.

b. Leaves not reflexed. Stem elongate. Dioecious.

62.**B.paludosa** Schleicher. — »Tortula crocea Bridel»: Lindb.

Leaves papillose sublinear-lanceolate broadly acuminate acute, denticulate above (at least the perichetial), not or slightly twisted when dry; basal cells long yellowish; costa percurrent or slightly excurrent, in perichetial leaves distinctly excurrent. Capsule oblong striate when dry; lid rostrate; teeth much contorted; annulus none. Stem reddish-tomentose often with propagula. Resembles somewhat *Dichodontium.* — Wet calcareous rocks. *Eur.* princ. in southern districts. Switzerl.! Austria: M. Huss; Venturi. France: Husnot.

63.**B.corsica** Schimper. — Ceratodon Sch.; Barbula Kindb.

Leaves faintly papillose narrowly ovate-lanceolate gradually subsubulate, entire, crisped when dry; cells subquadrate or short-rectangular; costa not excurrent. Perichetial leaves convolute with short broad obtuse point; costa not excurrent. Capsule suboblong; lid rostellate; teeth half-twisted with patent points when dry; annulus broad. Tufts dense. Habit of *Ceratodon*. — Sterile siliceous places r. *Eur.* Mediterr. distr. Italy: Arcangeli. France: Goulard.

c. Leaves entire not or indistinctly reflexed. Stem very short.

aa. Leaves papillose. Peristome rudimentary or wanting.

64.**B.bicolor** Br. eur. — Gymnostomum Br. eur.; Barbula Lindb.

Leaves ovate-lanceolate acuminate acute marked with orange stripes at base; basal cells short-rectangular yellow or brown-yellow; costa percurrent or short-excurrent. Capsule oblong-cylindric plicate when dry; annulus revoluble. Spores large. Tufts dense. Dioecious. — Crevices of calcareous rocks in higher alp. reg. r. *Eur.* Switzerl.: Schimper; Culmann.

bb. Leaves gen. smooth. Peristome much contorted.

65.**B.agraria** Hedwig. — Bryum Swartz.

Leaves subovate acute subinvolute, slightly twisted when dry; cells rhombic-quadrate somewhat large; costa subexcurrent. Perichetial leaves broader, short-acuminate or obtusate, not wholly convolute; costa not percurrent. Capsule narrow-cylindric; lid nearly as long; annulus revoluble. Stem nearly indistinct. Monoecious. — Rocks and sand r. *Amer.* »U. S.»: Lesq. et Jam. (Cuba: Wright, herb. Sullivant, com. C. Mueller; S:t Thomas: Breutel, com. Roell).

66.**B.Raui** Austin.

»Leaves smooth spathulate-ovate acuminate or apiculate; basilar areolation loose; costa subexcurrent. Perichetial leaves convolute often blunt; costa thin. Capsule oblong-cylindric plicate when dry; lid long; annulus narrow. Dioecious. — Rocks r. *Amer.* U. S.»: Lesq. et J.

67.**B.Joorii** C. Mueller in Flora 1875.

»Leaves nearly smooth from oblong half-sheathing base linear-lanceolate obtusate mucronulate, faintly crisped; basal cells short-rectangular hyaline; costa excurrent. Perichetial leaves from oblong sheathing base acuminate not mucronate. Capsule oblong; teeth rufous; calyptra rough. Dioecious. Habit of *B. unguiculata.* Stem very short. — *Amer.* r. U. S.»: C. M.

3. Leptobarbula Schimper.

68.**B.tenuis** Hedwig. — »Trichostomum Hedwig»: C. M.; Barbula Kindb.; Didymodon bericus Notaris.

Upper leaves from sheathing base tapering to a longer and narrow subulate or at apex obtuse entire acumen, crisped; basal cells rectangular; costa nearly filling the acumen but not excurrent. Capsule oval-oblong erect; lid much shorter; teeth half-twisted; pedicel red below, yellow above. Stem short not or loosely tufted. Sterile plants with smaller sublinear or ovate-oblong obtuse leaves. — Calcareous rocks and sandy soil in warmer districts r. *Eur.* Italy: Giordano, com. Bottini. Spain: Hegelmaier, com. C. Mueller. *Amer.* U. S. Massachusetts: Boll, com. C. M. Can. Brit. Col.: Macoun.

69.**B.macrostegia** Sullivant. — Trichostomum Sull. icon. muscor. (not mentionned in Lesq. et J. man.); Barbula Kindb.

Differs from the last: Leaves abruptly tapering to a somewhat broad but attenuate obtusate acute and near apex denticulate acumen. Capsule cylindric inclined or faintly curved; lid longer; teeth (as in *B. corsica* and *B. sparsidens*) spreading above. — *Amer.* r. »U. S.»: Sullivant.

4. Pseudo-Didymodon Kindb.

a. Acutæformes.

A. Peristome wanting; annulus revoluble. Leaves faintly papillose, straight when moist.

70.**B.rubiginosa** Mitten.

Leaves ovate-oblong or broadly ovate-lanceolate reflexed below, not appressed; cells short; costa scarcely excurrent. Perichetial leaves from ovate-oblong base tapering to a sublinear by costa not wholly (in lower part) filled point. Capsule suboblong pale brown; pedicel not long. Tufts greenish somewhat dense not high. — *Amer.* r. U. S. Pacif. distr.: Henderson, com. Cardot.

* **B.subicmadophila** C. M. et Kindb. l. c.

Leaves subpellucid above, more spreading when moist; the perichetial with shorter base. Peristome and annulus not seen. — *Amer.* r. Can. Brit. Col.: Macoun.

71.**B.melanocarpa** C. M. et Kindb. l. c.

Differs from *B. rubiginosa:* Leaves blackish brown appressed when dry; costa more distinctly excurrent. Capsule dark brown finally blackish; pedicel very long. Tufts loose. Fruiting stem very short. — Rocks r. *Amer.* Can. Brit. Col.: Macoun.

B. Peristome contorted.

a. Leaves smooth straight when moist. Peristome once contorted; annulus us. indistinct.

72.**B.acuta** Bridel. — Tortula Brid. 1806; Barbula Brid. 1819; Tortula gracilis Schleicher 1807; Barbula Schwægrichen.

Leaves ovate-oblong entire, reflexed below and strongly recurved near base, patent or twisted when dry; cells short; costa gen. short-excurrent or percurrent. Perichetial leaves suboblong with subulate acumen; costa long-excurrent. Capsule oval-oblong; annulus indistinct. Tufts olivaceous or green. — On earth r. *Eur.* Switzerl.! Austria: C. E. Kindberg. France: Berthoumieu. *Amer.* Can.: Macoun.

* **B.abbreviatifolia** H. Mueller.

Leaves appressed when dry; costa often longer excurrent. — Wet alp. rocks, sometimes in running water, r. *Eur.* Norway!

73.**B.viridis** Schimper.

Leaves longer than in *B. acuta,* narrowly ovate-lanceolate subulate-acuminate serrulate or denticulate above, reflexed below, crisped; basal cells short-rectangular; costa somewhat long-excurrent. Perichetial leaves as in the last. Capsule cylindric sometimes curved; annulus revoluble. Tufts green. — Rocks in warmer districts r. *Eur.* Switzerl. near Lugano! Belgium: Gravet. (*Asia*, Syria: A. H. Brotherus.)

74.**B.artocarpa** Lesquereux.

Differs from *B. acuta:* Upper leaves ovate-lanceolate subulate; basal cells rectangular; costa more distinctly excurrent. Capsule subcylindric. — On earth in higher alp. regions r. *Amer.* U. S. Oregon mt Hood 3300 metr. a. sea: Roell.

b. Leaves faintly papillose straight when moist. Peristome twice contorted; annulus distinct.

75.**B.icmadophila** Schimper; Braithwaite.

Leaves narrowly ovate-lanceolate reflexed below but not strongly recurved, longer acuminate than in *B. acuta*, appressed when dry; lower basal cells short-rectangular; costa long-excurrent. Tufts olivaceous or dark green. Capsule oval-oblong. Very r. fruiting. — Wet alp. rocks r. *Eur.* France: Thériot, com. Husnot. (*Asia*, Caucase: V. F. Brotherus).

c. Leaves faintly papillose or nearly smooth, curved when moist; lower basal cells pellucid rectangular.

aa. Costa of leaves subpercurrent, in the inner perichetial long-excurrent. Peristome pale contorted.

76.**B.pseudo-rigidula** Kindb. cat. Can. m.

Leaves from short ovate base long-acuminate, reflexed below, twisted when dry; costa brown. Inner perichetial leaves from oblong base narrowly acuminate. Capsule brown subcylindric.

Tufts fuscescent. — Rocks r. *Amer.* Can. Brit. Col.: Macoun (»B. rigidula» Canadian musci n. 412).

77.**B.subgracilis** C. M. et Kindb. l. c.

Leaves ovate-lanceolate reflexed nearly all around, crisped or flexuous when dry; costa reddish. Perichetial leaves faintly crenulate, the outer acuminate, the inner broad obtuse. Capsule red-brown oblong-cylindric. Tufts green or red-brown below. — Rocks r. *Amer.* Can. Brit. Col.: Macoun. U. S. Montana: Roell.

bb. Costa of leaves long-excurrent. Capsules unknown.

78.**B.Waghornei** Kindb. n. sp.

Leaves from short ovate half-sheathing base long-acuminate acute entire, slightly reflexed above base, faintly curled when dry; costa red. Tufts brown-red radiculose. Habit of *Didymodon rubellus.* — *Amer.* r. N. Foundl.: Rev:d A. C. Waghorne.

b. Purpureæformes.

A. Leaves long sublanceolate.

79.**B.purpurea** C. Mueller.

»Upper leaves gradually longer, from oblong base broadly lanceolate subobtuse, revolute to above middle, subtorquate when dry; cells small reddish quadrate; costa purplish thick excurrent. Capsule oval; teeth scarcely contorted; calyptra long. Tufts small purple; stem short naked below. — Rocks r. U. S. Calif.»: C. M. in Flora 1875.

80.**B.lateritia** Kindb. n. sp. — B. brachyphylla var. angustifolia C. M. et Kindb. l. c.

Leaves ovate lanceolate broadly acuminate subobtuse nearly smooth, slightly reflexed or partly flat at borders, crowded, appressed when dry; cells subpellucid subquadrate; costa red thick (princ. above), percurrent. Capsules unknown. Tufts compact brick red 1—2 c. m. high. — Rocks r. *Amer.* Can. Brit. Col.: Macoun.

B. Leaves short gen. ovate.

81.**B.brachyphylla** Sullivant.

»Leaves ovate obtuse recurved all around; costa percurrent. Capsule cylindric; lid long-rostrate; teeth scarcely half-twisted; calyptra short. Tufts dark brown dense high radiculose their whole length. — *Amer.* r. U. S.»: Lesq. et Jam.

82.**B.decursivula** Kindb. cat. Can. m.

Leaves recurved nearly all around, faintly papillose, loosely disposed and long-decurrent, subtorquate or loosely appressed when dry, gen. ovate acute; the uppermost of stem and some branches broadly ovate-lanceolate; cells short small pellucid exc. the elongate alar; costa red not excurrent. Capsules unknown. Tufts 2—3 c. m. high somewhat dense; stem naked below. — Rocks r. *Amer.* Can. Rocky mts: Macoun.

c. Fallaciformes.

A. Peristome very much contorted. Leaves faintly papillose.

83.**B.fallax** Hedwig.

Leaves with ovate base and carinate not much longer acumen, reflexed at least below middle, us. curled when dry; nearly all basal cells quadrate. Capsule brown oblong-cylindric; annulus not distinct. Tufts us. dense and not low, often rufescent below. — Earth and stone. *Eur.* common. Sweden, Switzerl., Italy! *Amer.* not common. Can.: Macoun.

* **B.brevifolia** Smith. — Tortula Sm.; Barbula Bridel.

Leaves smaller and shorter, nearly appressed when dry. Capsule smaller; teeth shorter. Tufts us. low and rufescent. — Rocks. *Eur.* not r. Sweden!

84.**B.subfallax** C. Mueller.

»Differs from *B. fallax* in its pale green color, basal leaf-cells more distinctly rectangular, capsule short-pedicellate, annulus simple; perichetial leaves longer and larger. — *Amer.* r. U. S.»: Lesq. et Jam.

B. Peristome not or faintly contorted. Leaves distinctly papillose.

85.**B.reflexa** Bridel. — B. recurvifolia Schimper.

Leaves narrowly ovate-lanceolate gradually subulate-acuminate sharply carinate, falcate when moist. Capsule subcylindric; teeth once contorted. Tufts us. brown and very high. Very r. fruiting. — Calcareous stones. *Eur.* not r. Sweden, Switzerl.! Engl.: West. *Amer.* r. Can.: Macoun; Drummond 139.

86.**B.sparsidens** C. M. et Kindb. l. c.

Leaves small ovate-lanceolate carinate reflexed nearly all around; lower basal cells rectangular hyaline. Capsule small reddish oblong-cylindric; teeth loosely half-twisted with spreading points when dry. Tufts loose 0,5—1 c. m. high, green above, ferruginous below. — On earth r. *Amer.* Can. Brit. Col.: Macoun.

87.**B.semitorta** Sullivant.

»Upper leaves linear-lanceolate gradually tapering from near the base, flat at borders, tufted and squarrose; costa thick percurrent. Capsule cylindric-oblong; teeth half-twisted; annulus very narrow not revoluble. Plants short simple loosely cespitose. — *Amer.* r. U. S.»: Lesq. et Jam.

88.**B.spadicea** Mitten.

Leaves channelled with short ovate base and longer acumen, reflexed below middle; lowest basal cells short-rectangular. Capsule cylindric; teeth short nearly straight. Tufts brown-green or fuscous not low. — On stone r. *Eur.* Norway, Switzerl.! Engl.: Whitehead. Germany: Schliephacke. *Amer.* Can.: Macoun.

* **B.Zetterstedtii** Schimper. — Didymodon Sch.; Barbula Kindb.; B. **vaginata** Lindb.

Leaves larger very acute, the perichetial half-sheathing. Capsules not seen. Resembles *Didymodon rigidulus.* — Rocks r. *Eur.* Sweden!; J. E. Zetterstedt; Lindberg.

d. Vinealiformes.

A. Leaves reflexed all around; cells very pellucid. Plants small.

89.**B.virescens** Lesquereux.

Leaves small broadly ovate-lanceolate nearly smooth; cells gen. short well-distinct, the upper round-oval not confluent. Capsule small cylindric; teeth contorted. Tufts green dense about 1 c. m. high. — Rocks r. *Amer.* U. S. Calif. near Oakland: Bolænder, com. C. Mueller.

B. Leaves partly flat at borders. Plants us. high and robust.

a. Upper leaf-cells opake confluent very papillose.

aa. Leaf-base long ovate-lanceolate; costa not excurrent.

90.**B.cylindrica** Taylor. — Zygotrichia Tayl.; Barbula Schimp.

Leaves large entire with long narrow acumen, crisped; basal cells short-rectangular. Perichetial leaves gradually acuminate; costa subexcurrent. Capsule reddish cylindric; teeth once contorted. Tufts rusty red us. high. Very r. fruiting in Europe. — Rocks and stonewalls. *Eur.* not r. in warmer distr. Sweden, Switzerl.! Belgium: Gravet. *Amer.* Can. Pacif. dist.: Macoun. U. S.: Roell.

91.**B.sinuosa** Wilson. — Dicranella Wils.; Barbula Braithwaite.

Differs from the last: Leaves lurid green less reflexed with broader base and longer sinuolate-denticulate acumen, often brittle; lower basal cells rectangular subhyaline. Capsules unknown. Habit of *Didymodon tenuirostris.* — Rocks r. *Eur.* Austria: Venturi. Engl.: Boswell. France: Berthoumieu. Belgium: Gravet. *Amer.* U. S. Wash.: Roell.

92.**B.elata** Durieu et Montagne.

Leaves entire nearly gradually subulate not large, faintly crisped; basal cells pellucid gen. rectangular. Perichetial leaves with narrower often sublinear channelled acumen; costa subexcurrent or in the shorter uppermost leaves wanting. Capsule reddish subcylindric; teeth contorted. Tufts brown-green often high. — *Amer.* r. Pacif. distr. U. S.: Roell; Henderson, com. Cardot.

bb. Leaf-base subovate or ovate-oblong; costa often excurrent.

93.**B.vinealis** Bridel.

Leaves with oblong base and not longer in upper part subulate-filiform acumen, reflexed below middle, nearly straight when moist; inner basal cells short-rectangular; costa nearly filling the upper part of acumen, in the more abruptly attenuate perichetial longer excurrent. Capsule short oblong-cylindric; teeth short pale once contorted. Tufts lower than in *B. cylindrica*, us. brown or brown-red. Not r. fruiting. — Rocks and stonewalls. *Eur.* not r. in warmer distr. Switzerl.! France: Husnot m. Gall. Italy: Venturi; Roell. *Amer.* r. Can.: Macoun.

94.**B.flexifolia** Hampe.

»Differs from *B. vinealis* in leaves crisped when dry, falcate when moistened, borders revolute; capsule narrower subcylindric dark red or brown; teeth much twisted reddish then whitish or variable in color. — On the ground r. *Amer.* U. S. Calif.»; Lesq. et Jam.

95.**B.circinnatula** C. M. et Kindb. l. c.

Leaves from ovate or ovate-oblong base somewhat abruptly narrowed to the subulate much longer acumen, reflexed below, curved when moist, circinnate when dry; basal cells gen. short dusky; costa well-distinct but not excurrent also in the nearly similar perichetial leaves. Capsule subcylindric; teeth pale much contorted; annulus simple by one row of large cells. Tufts greenish somewhat high, or red-brown below. — Wet earth and rocks r. *Amer.* Can. Pacif. distr.: Macoun.

96.**B.subcylindrica** Brotherus.

Leaves from subovate base abruptly narrowed to the longer and subobtuse acumen, falcate when moist; lower basal cells rectangular hyaline. Tufts dark brown. Capsules unknown. Otherwise as the last. — *Amer.* r. U. S. Pacif. distr.: Roell, com. Brotherus.

97.**B.horridifolia** C. M. et Kindb. l. c.

Differs from the both last and *B. vinealis* in leaves faintly papillose loosely disposed long-decurrent. Leaves from ovate base narrowed to a longer and long-subulate acumen, falcate when moist, crisped or spreading when dry; basal cells pellucid short-rectangular, the inner larger; costa broader below vanishing in apex, not excurrent. Capsule cylindric; teeth reddish scarcely more than once contorted with long in dry state spreading points. Tufts somewhat high, brown or rusty red below, greenish at tops. — Damp rocks r. *Amer.* Can. Pacif. distr.: Macoun.

98.**B.tortellifolia** C. M. et Kindb. l. c.

Differs from the last: Leaves broader, less distinctly decurrent; the comal larger and crowded with short-excurrent costa. Perichetial leaves suddenly tapering to a long narrow acumen; costa slightly excurrent. Peristome whitish. Tufts often higher sometimes quite red. — Wet rocks. *Amer.* Pacif. distr. princ. near sea. Can. less r.: Macoun.

b. Leaves also the uppermost nearly smooth; upper cells pellucid well-distinct.

99.**B.robustifolia** C. M. et Kindb. l. c.

Leaves shorter and more crowded than in the last, from ovate base narrowed to the subulate acumen, reflexed nearly to middle at one side, falcate or crisped; basal cells subquadrate hyaline; costa equally broad and distinct to apex, not excurrent. Capsules unknown. Tufts dark brown or olive-green. — Rocks r. *Amer.* Pacif. distr. Can.: Macoun. U. S.: Roell.

110. **Ceratodon** Bridel.

A. Leaves carinate. Outer perigonial leaves long-acuminate acute.

1.**C.purpureus** L. — Mnium L.; Ceratodon Brid.

Leaves reflexed nearly all around, entire or slightly denticulate near apex, gen. not decurrent, us. broadly ovate-lanceolate attenuate not subulate at apex; cells small us. chlorophyllose; costa us. percurrent. Inner perichetial leaves (1 or 2) obtusate or short-acuminate. Capsule sometimes strumose us. curved when dry; teeth with numerous articulations, often marginate; lid elongate-conic; pedicel red. Outer perigonial leaves with scarcely excurrent costa. Tufts us. not tomentose. Dioecious. — Gravelly soil. *Eur.* common. Sweden etc.! *Amer.* Can.: Macoun.

* **C.brevifolius** Milde. — C. dimorphus Philibert.

Leaves ovate-oblong; costa often long-excurrent. — R. *Eur.* Switzerl.: Philibert. *Amer.* U. S. Oregon: Lyall, com. Macoun.

* **C.xanthopus** Sullivant.

Leaves long-subulate; costa gen. excurrent. Perichetial leaves 2 or 3 more distinct. Pedicel yellow. — *Amer.* r. Can. Brit. Col.: Dawson, com. Macoun.

* **C.arcticus** Kindb. n. subsp.

Leaves small subdecurrent, not much patent when moist; cells hyaline not chlorophyllose, larger than in the common *C. purpureus.* Tufts compact tomentose. Capsules unknown. — Arctic distr. r. *Eur.* Spetsbergen near Kobbebay: Berggren 1868.

2.**C.conicus** Hampe. — Trichostomum Hampe; Ceratodon Lindb.; C. minor Austin.

Differs from *C. purpureus*: Leaves shorter; costa not r. excurrent. Capsule straight; teeth immarginate with few articulations. — Earth and walls r. *Eur.* Switzerl.!; Mari. *Amer.* Can. Brit. Col.: Macoun.

3.**C.Columbiæ** Kindb. revue bryol. 1896.

Leaves narrowly ovate-lanceolate subulate-acuminate, reflexed below the somewhat long serrulate acumen; costa gen. excurrent. Inner perichetial leaves (2 or 1) with somewhat long linear or lingulate acumen. Capsule curved when dry; teeth with numerous articulations, broadly margined; lid short-conic obtuse or subconvex; pedicel red. Outer perigonial leaves with long-excurrent costa. Monoecious. — *Amer.* r. Pacif. distr. Can. Brit. Col.: Macoun.

B. Leaves concave, princ. those of the long shoots. Perigonial leaves obtuse, the outer not long-acuminate.

4.**C.heterophyllus** Kindb. in Ottawa Nat. vol. V.

Leaves of the short stem very few, narrowly ovate-lanceolate subobtuse entire reflexed; costa percurrent. Shoot-leaves small oval obtuse not distinctly reflexed; costa scarcely percurrent. Capsule short not curved; teeth with few articulations; lid short-conic; pedicel pale red or yellowish, finally red or blackish. Dioecious. — Arctic distr. r. *Amer.* Alaska: J. M. Macoun.

111. **Geheebia** Schimper.

1.**G.gigantea** Funck. — Barbula Funck; Geheebia Boulay.

Leaves papillose entire carinate, reflexed below, gradually acuminate or subovate-lanceolate with acute or subulate apex, subfalcate when moist, spreading or faintly crisped when dry; lower cells sinuous, upper subquadrate; costa subpercurrent.

Tufts blackish or brown when dry, 6—20 c. m. high. Resembling *Barbula reflexa* but more robust. — Rocks in alp. region r. *Eur.* Switzerl.! France: Husnot. Germany: Holler. Austria: Berggren.

112. **Aloina** (C. M. as subg.) Kindb. in Skandinav. Naturforskaremötets handl. 1880.

A. Leaves close when dry, not patent when moist. Us. synoecious.

1.A.brevirostris Hooker et Greville. — Tortula H. et G.; Aloina Kindb. l. c. and Laubm. Schw. u. Norw.

Leaves ovate-oval very broad, cucullate above; costa not excurrent. Capsule us. cylindric with much shorter lid, r. subovoid with nearly half as long lid; teeth us. once contorted; calyptra reaching below lid; annulus broad partly revoluble. — Walls princ. in limestone districts. *Eur.* Sweden: Hartman. Norway: E. Nyman. *Amer.* Greenl.: Berggren. Can.: Macoun.

B. Leaves incurved when dry, patent when moist. Dioecious.

a. Peristome twice contorted; annulus broad revoluble. Calyptra reaching to the half of capsule.

2.A.stellata Schreber. — Bryum Schreber 1771; Aloina Kindb. Laubm. S. u. N.; Barbula rigida Hedwig 1787.

Leaves suboblong or narrower us. cucullate sometimes hairpointed; costa us. not excurrent. Capsule suboblong; lid much shorter; pedicel red-brown. — Walls and clay banks. *Eur.* Norway, Switzerl.! Austria: Venturi. Greece: Orphanides. *Amer.* Can.: Macoun.

3.A.macrorhyncha Kindb. — Barbula (Aloina) cat. Can. m.

Leaves round-ovate cucullate; costa not excurrent. Capsule oblong-ovoid; lid more than $^2/_3$ its length; pedicel pale red or yellowish. — On earth r. *Amer.* Can.: Macoun.

b. Peristome once contorted; annulus narrow us. persistent. Calyptra short. Capsule subcylindric.

4.A.ambigua Br. eur. — Barbula Br. eur.; Aloina Limpricht; A. ericæfolia Kindb. Laubm. S. u. N.; Tortula Lindb.

Leaves lanceolate-linear us. hamate-incurved at apex, sometimes subacute; costa not excurrent. Capsule erect at least twice longer than lid; pedicel yellowish above and reddish below, finally red-brown; calyptra not reaching below lid. — Walls. *Eur.* Norway! France: Husnot. Greece: Orphanides. Roemer. *Amer.* Can.: Macoun.

5.**A.aloides** Koch. — Trichostomum Koch; Aloina Kindb. l. c.; Tortula Notaris; Barbula Bruch.

Leaves shorter and narrower than in the last, incurved or cucullate, gen. acute with prominent subexcurrent costa. Capsule often inclined us. much longer than lid; pedicel reddish; calyptra not much prolonged below lid. — Clay banks. *Eur.* France: Husnot. Germany: Roemer. Italy: Arcangeli. Greece: Orphanides.

113. **Crossidium** Juratzka.

A. Leaves blunt. Dioecious.

1.**C.chloronotos** (Bridel in part) Bruch. — Barbula (Brid.) Bruch; Crossidium Limpricht.

Leaves oblong-lingulate, appressed when dry; hairpoint shorter nearly smooth; upper leaf-cells greenish. Capsule narrow-oblong at least twice longer than the rostrate lid; teeth twice contorted; tube long. Tufts dense. — Calcareous rocks and soil r. *Eur.* Mediterr. distr. France: Schimper; Venturi; Philibert.

2.**C.Heinrici** Rau. — Barbula Rau; Crossidium Kindb.

»Differs from the last: Leaves few small more arrounded at apex; some cells decolorate; hairpoint denticulate. Capsules unknown. — *Amer.* r. U. S. Kansas: Rau»: C. M. in Flora 1886.

3.**C.Manniæ** C. Mueller. — Barbula (Argyrobarbula) C. M.; Crossidium Kindb.

»Leaves few small without hairpoint; lamellæ few. Capsule small; peristomial tube short. — *Amer.* r. U. S.»: C. M. in Flora 1887.

B. Leaves narrowed above to the subacute apex. Monoecious.

4.**C.squamigerum** Viviani. — Barbula Viv.; Crossidium Jur.; Tortula membranifolia Hooker; Barbula Schultz.

Leaves subovate; hairpoint us. as long and denticulate; upper leaf-cells hyaline. Capsule oblong, subcylindric or suboval, finally blackish, longer than the rostrate lid; teeth twice contorted; tube long. Tufts dense. — Calcareous stones in warmer distr. r. *Eur.* France: Le Jolis; Bouvet. *Amer.* »U. S.»: Lesq. et Jam.

5.**C.griseum** Juratzka.

Differs from the last: Capsule finally brown; teeth shortish not or faintly twisted nearly without basal tube. Leaves with nearly smooth often longer hairpoint; those of shoots more obtuse. — *Eur.* r. Italy: Roell; Bottini.

114. Pterygoneuron Juratzka.

A. Capsule immersed; calyptra mitriform. Leaves with long rough hairpoint.

1.**P.subsessile** Bridel. — Gymnostomum Brid.; Pterygoneuron Jur.; Pharomitrium Schimper.

Leaves suboval or obovate subacute not reflexed, papillose at back. Capsule oval-globose; pedicel shorter; lid rostrate; peristome none. Stem 2—5 m. m. high. — Sand and clay r. *Eur.* Austria: Berggren. Germany: Schultze. *Amer.* Can.: Macoun.

B. Pedicel exserted; calyptra cucullate. Leaves with smooth point.

2 **P.cavifolium** Ehrhart. — Pottia Ehrh.; Pterygoneuron Jur.

Differs also from the last in leaves smooth at back. — Clay soil, often on walls. *Eur.* not uncommon. Sweden! France: Husnot. *Amer.* Can.: Macoun; Drummond.

3.**P.lamellatum** Lindberg. — Tortula Lindb.; Pterygoneuron Jur.; Barbula cavifolia Schimper.

Differs from the last: Leaves papillose at back, faintly reflexed below; costa shorter excurrent. Capsule oblong-cylindric; peristome slightly twisted, loosed with difficulty; basal membrane clathrate. Stem somewhat higher. — Wet clay soil r. *Eur.* France: Bescherelle. Austria: Berggren.

115. Didymodon Hedwig, in part.

A. Leaves gen. entire; cells small at least the upper, r. (in *Stegonia*) large.

a. Leaves not reflexed, often involute. Peristome not twisted.

I. **Stegonia.** Leaves close also when moist, smooth entire very broad concave or involute; cells large. Perichetial leaves not sheathing. Stem short. Monoecious. Spores large.

II. **Trichostomum.** Leaves not imbricate when moist, us. crisped when dry, papillose us. narrow. Spores small.

1. **Pusilli.** Peristome slightly twisted. Plants small; stem very short. Monoecious.

2. **Crispuliformes.** Peristome not twisted. Dioecious. Plants larger.

b. Leaves not involute gen. reflexed.

aa. Leaves half-sheathing, sometimes dentate above.

III. **Erythrophyllum.** Leaves reflexed papillose us. pointed by a long pellucid apical cell; basal cells long, hyaline or finally reddish. Perichetial leaves sheathing. Peristome pale straight. Tufts us. rusty red. Us. synoecious.

bb. Leaves entire not sheathing. Tufts dense.

IV. **Desmatodon.** Leaves short broad gen. reflexed, crisped; basal cells long somewhat large and hyaline; costa often long-excurrent. Peristome straight. Habit of *Barbula* (Zygotrichia). Often monoecious.

V. **Eu-Didymodon.** Leaves reflexed us. short, r. twisted when dry; cells small gen. short, the inner basal us. rectangular yellowish; costa gen. not or slightly excurrent. Peristome sometimes twisted. Habit of *Barbula* (Eu-Barbula). Dioecious often sterile.

B. Leaves gen. denticulate, not imbricate, sometimes with propagula; cells somewhat large; costa not or shortly excurrent. Peristome r. present. Us. dioecious.

VI. **Leptodontium.** Leaves dentate or denticulate, often not reflexed, gen. broad and obtusate, often crisped when dry; basal cells at least the lowest rectangular hyaline.

VII. **Hydrogonium.** Differs from subg. *Leptodontium* in entire leaves.

I. Stegonia Venturi revue bryol.

1.**D.latifolius** Schwægrichen. — Weisia Schw.; Didymodon Kindb.; Pottia C. M.

Leaves orbicular or subcochleariform gen. obtuse, sometimes apiculate or with long hairpoint; upper cells subrhombic, the lower hyaline longer; costa abbreviate or percurrent. Capsule suboval or subcylindric; teeth pale red. Spores 0,03—0,04 m. m. Tufts low green somewhat silver-like. — Earth on alp. rocks. *Eur.* less r. Norway, Switzerl.! Austria: Breidler. *Amer.* r. Can.: Macoun; Drummond 70.

II. Trichostomum Hedwig, in part.

1. Pusilli.

2.**D.triumphans** Notaris. — Trichostomum Not.; Didymodon Kindb.

Leaves lanceolate-linear acute or obtuse; costa short-excurrent. Perichetial leaves sheathing. Capsule oval; pedicel pale yellow or at base reddish. — Earth and walls r. *Eur.* princ. in Mediterr. distr. France: Philibert.

* **D.monspeliensis** Schimper. — Trichostomum Sch.; Didymodon Kindb.

Leaves concave, the perichetial with percurrent costa. Annulus simple. — *Eur.* r. »France»: Schimper.

* **D.Philiberti** Schimper. — Trichostomum Sch.; Didymodon Kindb.

Perichetial leaves with excurrent costa. Annulus simple. — *Eur.* r. France: Philibert; Goulard.

* **D.pallidisetus** H. Mueller. — Trichostomum H. M.; Didymodon Kindb.

Leaves plane below, the perichetial with percurrent costa. Capsule finally striate; annulus simple; pedicel wholly pale yellow. — *Eur.* r. Germany: Geheeb.

2. Crispuliformes.

A. Leaves carinate from dilated undulate base gradually subulate. Habit of *Barbula* (Tortella). R. fruiting.

3.**D.cylindricus** Bruch. — Weisia Bruch; Didymodon Br. eur.

Leaves long narrow acute or subobtuse, sometimes sparingly denticulate near apex; basal cells hyaline; costa not excurrent. Capsule cylindric. Tufts dark green. — Siliceous rocks. *Eur.* not common. Switzerl.! Sweden: Lindberg. *Amer.* Can.: Macoun.

4.**D.hibernicus** Mitten. — Tortula Mitt.; Didymodon Kindb.

Differs from the last: Leaves entire acute more dilated at base; basal cells abruptly passing to the rounded green ones. Stem often very long. — Wet rocks r. *Eur.* Ireland: Stewart and Holt.

B. Leaves not carinate, sublinear or with sublinear or subulate acumen, entire.

a. Leaves channelled or involute; basal cells us. yellowish, upper very small opake papillose.

5.**D.brachydontius** Bruch. — Trichostomum Bruch; Didymodon Wilson; Trichostomum mutabile Notaris.

Leaves sublinear or narrowly ovate-lanceolate gen. acute, sometimes ovate-oblong short-acuminate, not channelled near apex; basal cells brownish or yellowish; costa excurrent. Capsule oval-oblong or subcylindric; teeth smooth us. short irregular; pedicel yellow. Tufts loose 1—2 c. m. high or lower. — Calcareous rocks. — *Eur.* Switzerl.! Sweden: Zetterstedt; P. Larsson. Belgium: Roemer. France: Philibert; Brébisson.

6.**D.lutescens** Lindberg. - Mollia Lindb.; Didymodon Kindb.

Differs from the last: Leaves smooth pellucid longer-apiculate; upper cells better defined. Tufts yellowish green. Capsules unknown. — Fissures of limestone rocks r. — *Eur.* »Irel.: Lindb.»: Braithwaite.

7.**D.crispulus** Bruch. — Trichostomum Br.; Didymodon Wilson.

Leaves from subovate base sublinear or r. suboblong, short-attenuate often subobtuse, distinctly channelled or involute;

basal cells yellowish or subhyaline; costa often excurrent to a curved point. Capsule oval-oblong; teeth papillose often deeply cleft; pedicel red. Tufts dense very low or 2—6 c. m. high. — Calcareous stones. *Eur.* Sweden, Switzerl.! Spain: Levier. France: Roux; Berthoumieu. *Amer.* r. »U. S.»: Lesq. et Jam.

8.**D.viridulus** Bruch. — Trichostomum Br.; Didymodon Kindb.

Differs from the last: Leaves longer, linear-lanceolate, gradually long-acuminate subulate. Capsule smaller. Stem low. — *Eur.* r. Sweden! Switzerl.: Culmann, eom. Husnot.

9.**D.brevifolius** Sendtner. — Trichostomum Sendt.; C. M. syn.; Didymodon Kindb.; Mollia Braithwaite.

Leaves short from broader base nearly gradually attenuate obtuse; basal cells yellowish pellucid; costa sometimes excurrent. Capsule minute round-oval; lid as long; teeth papillose; pedicel reddish below, yellow above. Tufts dense 0,5—1,5 c. m. high. Habit of *D. crispulus.* — Limestone rocks r. *Eur.* »Engl.»: Braithwaite. »Bosnia: Sendtner»: C. M.

b. Leaves concave not involute, somewhat broad and suboblong-linear; basal cells hyaline.

10.**D.littoralis** Mitten. — Trichostomum Mitt.; Didymodon Kindb.

Leaves obtuse; costa smooth yellowish short-excurrent. Capsule oblong; teeth deeply cleft. Tufts green 1—4 c. m. high. — Rocks near Atlantic sea r. *Eur.* Engl.: Curnow. France: Le Jolis. Norway: Hagen.

11.**D.trachyneuron** Kindb. n. sp.

Leaves short-attenuate subacute brittle; costa pale, papillose at back, sometimes excurrent. Tufts low green. Capsules unknown. — Rocks r. *Amer.* Can. near Quebec: Macoun.

III. Erythrophyllum Lindberg.

A. Leaves nearly smooth and faintly reflexed, not twisted when dry. Tufts loose eradiculose. Capsules unknown.

12.**D.oenodes** C. M. et Kindb. — D. oeneus C. M. et Kindb. cat. Canad. m. (not D. æneus Schimper).

Leaves vinous-red ovate-oblong or narrowed from subovate base, acute entire not apiculate, loosely appressed when dry; costa nearly smooth at back. — Rocks r. *Amer.* Can. Brit. Col.: Macoun.

B. Leaves distinctly papillose and reflexed, crisped. Tufts dense.

a. Leaves from broad-ovate base long-subulate; costa sometimes excurrent. Plants robust.

13. **D. ruber** Juratzka.

Leaves long acute or subobtuse at apex, often denticulate near it. Inner perichetial leaves subfiliform-subulate smooth and not recurved; costa filling nearly the whole upper part of acumen. Capsule straight; cells of the rostellate lid in straight rows. Tufts reddish. Dioecious, very r. fruiting. — Alp. rocks r. *Eur.* Austria: Breidler. Switzerl. fruiting: Philibert.

b. Leaves short-acuminate or obtusate obliquely apiculate; costa not excurrent. Plants not robust.

14. **D. rubellus** Hoffmann. — Bryum Hoffm.; Didymodon Br. et Sch.

Leaves from short ovate base sublinear-cultriform, at apex us. obtusate and entire or with few teeth. Perichetial leaves nearly as long and similar. Capsule straight or indistinctly curved; cells of lid as in the last. Us. synoecious. — Stone and earth. *Eur.* common. Sweden etc.! *Amer.* not r. Can.: Macoun; Waghorne.

15. **D. alpigenus** Venturi. — D. rubellus var. dentatus Schimper.

Leaves as in the last but more distinctly acuminate acute often dentate near apex. Perichetial leaves subsubulate narrower. Capsule narrower; lid with obliquely seriate cells. Dioecious. — Rocks in alp. regions r. *Eur.* Norway, Switzerl.! *Amer.* »Greenl.»: Lange.

16. **D. canadensis** Kindb. cat. can. m.

Differs from *D. rubellus*: Capsule narrower. Perichetial leaves short acuminate smooth not reflexed. Dioecious. — Rocks r. *Amer.* Can.: Macoun; Waghorne.

17. **D. subruber** Kindb. revue bryol. 1896.

Leaves as in *D. rubellus* but often dentate. Perichetial leaves long-subulate not recurved. Capsule curved; lid rostrate. Dioecious. — Rocks r. *Amer.* Can. Brit. Col.: Macoun.

18. **D. Baden-Powelli** Kindb. in Ottawa Natur. vol. V.

Leaves as in *D. rubellus* but smaller shorter often denticulate, less twisted when dry. Perichetial leaves as in *D. canadensis.* Capsule curved; lid short blunt very thick. Tufts very compact, pale brown below. Dioecious. — Arctic distr. r. *Amer.* Alaska: J. M. Macoun.

19. **D. Debati** Husnot revue bryol. 1895.

Differs from other species of this section in leaves densely serrulate above basal part. Leaves from narrowly oblong base gradually tapering to a scarcely longer acumen, not or slightly crisped when dry. Stem about 5 c. m. long. Capsules unknown. -- Stony places r. *Eur.* r. »France, 2000 metr. a. s.»: Husnot l. c.

IV. Desmatodon (Bridel) Schimper, in part.

A. Leaves with not excurrent costa, papillose.

20.**D.arenaceus** Sullivant et Lesquereux. — Desmatodon S. L.; Sulliv. icon. m.; Didymodon Kindb.

Leaves suboblong or oblong-lanceolate gen. obtuse, reflexed nearly all around. Capsule long cylindric; teeth short whitish cleft to middle; lid short thick. Stem 1—2 c. m. high. Monoecious or pseudo monoecious. -- Sandstone rocks r. *Amer.* U. S.: Sullivant, com. C. Mueller; Demetrio, com. Cardot. *Eur.* »Norway»: Hagen.

B. Leaves with long-excurrent costa.

22.**D.plinthobius** Sullivant et Lesquereux. — Desmatodon S. L.; Didymodon Kindb.

Differs otherwise from the last: Lid of capsule narrower somewhat longer. Dioecious. — Limestone rocks r. *Amer.* U. S.: Ravenel, com. C. Mueller; Langlois, com. Cardot.

22.**D.neomexicanus** Sull. et Lesq. — Desmatodon S. L.; Didymodon Kindb.

»Differs from the last in nearly entire peristomial teeth. Monoecious. — *Amer.* r. U. S. Texas: Wright»: Lesq. et Jam.

23 **D.systylius** Schimper. — Desmatodon Sch.; Didymodon Kindb.

Leaves oblong-lingulate acute gen. short-acuminate, subpellucid and nearly smooth, flat or near base indistinctly reflexed. Capsule cylindric; teeth irregularly cleft yellowish or reddish; lid systylic; pedicel yellow or finally pale red. — Rocks r. *Eur.* in higher alp. region. *Eur.* Norway. *Amer.* N. Foundl.: Waghorne (»D. systylioides» Ren. et Card.). Can. Manitoba: Macoun.

V. Eu-Didymodon.

A. Leaves broadly acuminate or obtuse. Tufts not high.

a. Leaves papillose; costa not excurrent. Peristome well-evolute.

24.**D.tophaceus** Bridel. — Trichostomum Brid.; Didymodon Juratzka; D. Hendersoni Ren. et Card.; Barbula brevifolia Lindb.

Leaves ovate-oblong or ovate, obtuse or acute us. concave with thick borders, more or less crisped. Capsule ovate-oblong or subcylindric; pedicel red. Tufts olivaceous reddish-brown below us. very compact r. loose. — Rocks princ. calcareous and stonewalls. *Eur.* princ. in warmer districts, not r.

Switzerl., Norway! France: Le Jolis. *Amer.* Can.: Macoun. U. S.: Henderson, com. Cardot.

b. Leaves smooth. Peristome often rudimentary.

25.**D.luridus** Hornschuch. — Trichostomum Spruce.

Leaves ovate oblong or broadly ovate-lanceolate acute, nearly appressed when dry; cells short; costa percurrent. Capsule oval-oblong or subcylindric; pedicel red. Tufts finally lurid-brown. — Rocks and stonewalls. *Eur.* not r. in warmer distr. Switzerl.! Engl.: Holt. France: Husnot. Germany: Herpell. *Amer.* r. Can.: Macoun. U. S.: Mrs L. C. Feely.

26.**D.Lamyi** Schimper; Husnot.

Differs from the last: Leaves slightly crisped; basal cells long hyaline; costa slightly excurrent. Pedicel yellow above. Tufts dark green. — Rocks r. *Eur.* France: Lamy, com. Husnot.

27.**D.cordatus** Juratzka. — Trichostomum Milde.

Leaves broader than in *D. luridus*, subcordate at base, curved when dry, often short subovate; costa percurrent or slightly excurrent. Tufts green often with propagula. Capsules unknown. — Schistose and calcareous rocks r. *Eur.* Switzerl.! Italy: E. Adlerz. Germany: Herpell.

B. Leaves narrowly acuminate.

a. Leaves gen. papillose, faintly twisted when dry. Tufts us. low and fuscescent.

28.**D.rigidulus** Hedwig. — Barbula Mitten.

Leaves from long ovate-lanceolate base tapering to the narrow nearly as long acumen, with thick reflexed borders, nearly straight when moist; the upper part of acumen nearly filled by costa; lower basal cells often long. Capsule oval-oblong or cylindric; teeth not contorted but us. faintly twisted; pedicel red. — Rocks and stonewalls. *Eur.* not r. Sweden, Norway, Switzerl.! Scotl.: Fergusson. *Amer.* r. Can.: Macoun. U. S.: Roell.

29.**D.validus** Limpricht.

Leaves smooth from ovate-oblong base tapering to a not long acumen, gen. with thick reflexed borders, nearly straight when moist; cells gen. short; costa thick often long-excurrent. Capsules unknown. Tufts brown loosely cohering, about 1 c. m. high (»5 c. m. or more»: Limpricht). — Calcareous alp. rocks r. *Eur.* Austria: Gander.

30.**D.Dieckii** Brotherus. — Barbula Broth.; Didymodon Kindb.

Leaves from broad ovate-oblong base abruptly narrowed to the subulate not longer acumen, flat above, not or slightly reflexed below, straight when moist; nearly all cells quadrate; costa short-excurrent or percurrent. Capsules unknown. Habit of the last. — *Amer.* r. U. S.: Roell, com. Brotherus.

b. Leaves mamillose nearly appressed when dry. Tufts us. red-brown, often high and very large.

31.**D.rufus** Lorentz. — Barbula Juratzka.

Leaves from ovate or ovate-lanceolate base gradually acuminate acute, faintly reflexed to above middle; nearly all cells short; costa percurrent. Capsules unknown. — Alp. rocks r. *Eur.* Austria: Breidler. Switzerl.: Pfeffer. Norway: Zetterstedt; Hagen; E. Nyman. *Amer.* »Greenl.: Berggren.

VI. Leptodontium Hampe.

A. Leaves broadly limbate all around by pale cells, denticulate nearly all around, papillose.

32.**D.recurvifolius** Taylor. — Bryum Tayl.; Didymodon Wilson.

Leaves ovate-oblong obtusate subobtuse not reflexed, spreading when moist; costa short-excurrent. Capsules unknown. Tufts blackish brown 2—10 c. m. high. — Wet rocks r. *Eur.* Engl.: Holt.

B. Leaves not or indistinctly limbate, entire below middle.

a. Leaves papillose and reflexed; costa not percurrent.

33.**D.flexifolius** Dickson. — Bryum Dicks.; Didymodon Hooker et Taylor.

Leaves oval-oblong or lingulate, obtusate acute or apiculate, dentate above middle or in upper third, reflexed at both sides, spreading when moist. Capsule cylindric; teeth fugacious sometimes entire; pedicel pale yellow. Stem 1—3 c. m. high. — Bare gravelly and turfy places in warmer districts r. *Eur.* Engl.: Boswell. France: Husnot.

34.**D.styriacus** Juratzka.

Differs from the last: Leaves narrower, sparingly dentate near apex, reflexed at one side, patent when moist; lower basal cells gen. wider. Capsules unknown. — Alp. rocks r. *Eur.* Austria: Breidler.

b. Leaves papillose not reflexed; costa sometimes excurrent.

35.**D.gemmascens** Mitten. — Leptodontium Braithwaite; »Streptopogon Mitten»: Braithw.

Leaves broadly ovate-lanceolate acuminate acute, distantly dentate above, spreading or claviculiform when moist; costa short-excurrent with propagula at apex. Stem 2—5 c. m. high. Capsules unknown. — »On thatched roofs» r. *Eur.* Engl.: Davies, com. W. H. Pearson.

36.**D.Heimii** Hedwig. — Gymnostomum H.; Didymodon Kindb.; Pottia Fuernrohr.

Leaves lanceolate or sublingulate, the upper long-acuminate acute, densely serrulate above, not spreading; costa us. not excurrent. Capsule short subcylindric or oval-oblong; lid systylic; peristome none; pedicel red. Stem 1—2 c. m. or lower. Monoecious or synoecious. — Wet soil often near sea sometimes in alps. — *Eur.* not uncommon. Sweden, Norway! Spetsbergen: Berggren. *Amer.* Can.: J. Macoun; Drummond; Waghorne. Alaska: J. M. Macoun.

* **D.Ryani** Philibert. — Pottia Phil.; Didymodon Kindb.

»Leaves very small, oval or short-oblong, very obtuse and entire. Lid of capsule short and thick. — *Eur.* Norway: Ryan»: Philibert revue bryol. 1896.

37.**D.heimioides** Kindb. — Pottia Kindb. cat. Can. m.

Leaves suboblong, the lower obtuse, the upper short-acuminate acute; costa gen. excurrent. Capsule cylindric longer and narrower than in the last; peristome present but rudimentary; pedicel golden yellow. Stem only 2—3 m. m. high. Otherwise as the last. — Earth in alps r. *Amer.* Can. Rocky mts: Macoun.

c. Leaves smooth distantly dentate or denticulate.

38.**D.riparius** Austin. — Pottia Aust.; Sulliv. icon. m.; Didymodon Kindb.; Barbula lingulata Warnstorf; Trichostomum Warnstorffii Limpricht.

Leaves oval-oblong or lingulate obtuse sometimes apiculate, sparingly denticulate near apex sometimes to $^1/_4$, patent when moist; only the lowest basal cells rectangular; costa not or scarcely percurrent. Capsule oblong-cylindric; peristome unknown; annulus broad. Stem to 3 c. m. high, sometimes with propagula. — Wet rocks near water r. *Eur.* Switzerl.: Weber; Culmann, com. Husnot. *Amer.* U. S.: Austin, com. Mrs Britton.

39.**D.Macounii** Kindb. (new name). — Leptodontium canadense Kindb. cat. Canad. m.

Leaves lanceolate or narrowly oblong-lingulate acute, coarsely dentate at least in upper half, spreading when moist; lower basal cells rectangular; costa percurrent or short-excurrent. Stem scarcely 1 c. m. high. Capsules and male plants unknown. — Stones in rivers r. *Amer.* Can.: J. Macoun.

VII. Hydrogonium C. Mueller.

40.**D.Ehrenbergii** Lorentz. — Trichostomum Lor.; Didymodon Kindb.; Trichostomum (Hydrogonium) mediterraneum C. M.

Leaves sublinear or ovate-lanceolate subobtuse not (or indistinctly near base) reflexed, patent when moist; basal cells narrow hyaline, the others smooth subpellucid sparingly chlorophyllose; costa not or scarcely excurrent. Capsules unknown. Stem often 3—6 c. m. high. — Wet calcareous rocks r. *Eur.* »France: Taxis»: Boulay (*Africa*, Alger: Debat; Philibert).

116. **Pottia** Ehrhart.

A. Leaves smooth with hyaline cells. Paroecious.

1.**P.venusta** Juratzka.

»Upper leaves long obovate-oblong spathulate short-acuminate not reflexed; costa excurrent. Capsule oval-cylindric; teeth none; annulus double persistent. — *Eur.*»: Schimper (»*Asia* island Cyprus: Unger»: Jur.).

2.**P.pallida** Lindberg.

»Leaves recurved near middle, shorter than in the last. Capsule oval-oblong; annulus none. Smaller than the last. — *Eur.* r. Spain: J. Lange»: Schimper.

B. Leaves often papillose; cells more or less chlorophyllose.

a. Paroecious. Leaves us. reflexed and papillose; costa long-excurrent.

3.**P.crinita** Wilson.

Leaves broadly oblong-lingulate obtusate often obtuse, papillose and reflexed. Capsule us. suboval; teeth wanting or rudimentary; pedicel orange; calyptra us. smooth — Moist banks and rocks near sea r. *Eur.* Engl.: Ralfs.

* **P.viridifolia** Mitten; Braithwaite.

Lower leaf-cells shorter, the upper smaller. Peristome none. — Rocks near sea r. *Eur.* Irel.: Stewart. France: Le Jolis.

* **P.asperula** Mitten; Braithwaite.

Leaf-cells as in *P. crinita *viridifolia*. Peristome none. Calyptra scabrous. — *Eur.* r. Engl.: Curnow.

* **P.Wilsoni** Hooker. — Gymnostomum Hook.; Pottia Br. eur.

Lower leaf-cells long narrow, the upper very small. Capsule narrower; teeth rudimentary. Calyptra scabrous. — Sandy rocky ground r. *Eur.* France: Lamy. Engl.: Curnow. *Amer.* »U. S.»: Lesq. et Jam.

4.**P.cuneifolia** Solms Laubach.

Lower leaves linear-oblong, the upper longer and spathulate-oblong subobtuse smooth r. reflexed. Capsule oval-oblong small; teeth indistinct; pedicel reddish. Plants small. — *Eur.* r. Portugal: Solms Laubach, com. Venturi.

5.**P.Notarisii** Schimper.

»Differs from *P. crinita*: Leaves smaller narrower; upper cells scarcely chlorophyllose. Capsule oblong-cylindric longer narrower and longer-pedicellate. — *Eur.* r. Sardinia: F. Mueller»: Schimp. syn.

b. Monoecious. Leaves often smooth and not reflexed. Pedicel reddish.

6.**P.truncatula** L. — Bryum L; Pottia Lindb.; P. truncata Fuernrohr.

Leaves subobovate acute or short-acuminate smooth not reflexed; costa not long-excurrent. Capsule short cupuliform or subhemisphæric; teeth none. — Earth in fields and gardens. *Eur.* common. Sweden! France: Husnot. *Amer.* Can.: Macoun. U. S.: com. Macoun.

7.**P.lanceolata** Hedwig. — Leersia H; Pottia C. M.

Leaves oblong-lingulate acute obtusate or short-acuminate, us. reflexed and more or less papillose; costa often long-excurrent. Capsule oblong-oval; teeth often well-evolute. — On earth. *Eur.* not r. Switzerl.! Sweden: S. Hardin. France: Puget. Italy: Arcangeli.

* **P.littoralis** Mitten; Braithwaite.

Leaves nearly smooth; costa shorter-excurrent. Peristome none. — Sandy soil near sea r. *Eur.* Engl.: Rogers. *Amer.* Can.: Macoun.

* **P.intermedia** Turner. — Gymnostomum Turn.; Pottia Fuernrohr.

Leaves faintly papillose sometimes slightly reflexed; costa short-excurrent. Capsule gen. subcylindric; teeth none or rudimentary. — Banks and walls. *Eur.* not r. Sweden! France: Brébisson. *Amer.* r. Can.: Macoun.

117. **Dermatodon** Huebener.

1.**D.cernuus** Huebener. — Desmatodon Br. eur.; Cynodontium latifolium Schwægrichen.

Leaves oblong sublingulate sharply acuminate acute limbate papillose, reflexed at least to middle, us. denticulate near apex; costa excurrent finally reddish. Capsule broad-ovate inclined or horizontally patent with erect neck, finally red-brown; teeth long us. deeply cleft; lid apiculate; pedicel straight yellow finally red 10—16 m. m. long. Spores about 0,04 m. m. Tufts dense to 2--3 c. m. high, often lower. Monoecious.

— Calcareous stones and walls or (in Amer.) on earth, not common. *Eur.* Switzerl.! Austria: Breidler. Norway: Zetterstedt. *Amer.* Can.: Macoun; Drummond 114.

* **D.xanthopus** Kindb. — Desmatodon Kindb. cat. Can. m.

Leaves less chlorophyllose; costa greenish. Capsule larger; teeth more united; pedicel yellow not red. — On earth r. *Amer.* Can.: Macoun.

2.**D.camptothecius** Kindb. — Desmatodon cat. Canad. m.

Differs from *D. cernuus*: Leaves narrower and longer, subobtuse gen. entire, nearly smooth, reflexed only near base; costa greenish. Capsule arcuate pale brown or pale red; teeth short cut in 2—4 partly cohering segments; lid with oblique beak; pedicel flexuous arcuate when young, reddish yellow. — Rocks near Atlantic sea r. *Amer.* Can.: Macoun; Waghorne.

118. **Weisia** Ehrhart.

A. Leaves long narrow, serrate at the broad base, at least the perichetial. Dioecious. Stem us. high.

I. **Eucladium.** Capsule long-exserted; lid deciduous; teeth more or less cleft; annulus persistent or indistinct. Leaves not recurved, gen. faintly crisped when dry; cells pellucid; costa excurrent.

B. Leaves broad entire crisped. Monoecious or paroecious.

II. **Pseudo-Pottia.** Capsule long-exserted; teeth often present; lid deciduous. Leaves concave often recurved; upper cells small; costa sometimes excurrent Habit of *Pottia.* Stem low.

C. Leaves entire narrow gen. sublinear.

a. Leaves often involute us. crisped; costa often excurrent. Stem low. Often monoecious.

III. **Astomum.** Capsule not emerging above upper leaves; lid persistent or loosed with difficulty; teeth none. Stem very short.

IV. **Hymenostomum.** Capsule long-exserted; lid deciduous; teeth none. Leaves crowded; costa excurrent. Monoecious.

V. **Eu-Weisia.** Capsule long-exserted; lid deciduous; teeth present at least rudimentary, us. entire. Leaves crowded; costa sometimes not excurrent.

b. Leaves not involute and not or slightly crisped; costa not excurrent. Dioecious. Stem often high.

VI. **Hymenostylium.** Capsule without peristome; lid systylic; annulus none. Leaves partly recurved; upper cells more or less pellucid.

VII. **Gymnostomum.** Capsule sometimes but r. with peristome; lid deciduous not systylic; annulus often present. Leaves sublinear not recurved; cells gen. subquadrate, the upper us. opake and very small.

I. Eucladium Br. eur.

1.**W.verticillata** L. — Bryum L.; Weisia C. Mueller.

Leaves carinate brittle from short ovate base somewhat abruptly narrowed to the nearly subulate acumen; inner basal cells much larger than the outer. Capsule brownish suboblong; teeth cleft or perforated. Tufts eradiculose us. encrusted with calcareous deposite. R. fruiting. -- Dripping calcareous or sandstone rocks. *Eur.* princ. in southern distr. not r. Switzerl.! Sweden very r.! Spain: Levier; Dieck, com. Roell. Greece: Heldreich. *Amer.* r. Can.: Macoun.

II. Pseudo-Pottia Kindb.

A. Leaves not recurved. Peristomial teeth well-evolute more or less perforated; annulus distinct. Monoecious.

2.**W.cæspitosa** Bruch. — Pottia C. M.; Trichostomum Jur.

Leaves suboblong acute or short-acuminate; basal cells small short-rectangular; costa short-excurrent. Capsule subovate small-mouthed us. twice longer than the rostellate lid; pedicel yellow. Often loosely tufted. — Bare calcareous soil in warmer distr. r. *Eur.* France: Philibert; Brébisson. Germany: Schemmann.

B. Leaves recurved. Peristome us. imperfect or wanting; annulus not distinct. Paroecious.

3.**W.Starkei** Hedwig. — Pottia C. M.

Leaves subobovate-oblong or narrower, acute or short-acuminate, recurved nearly all around; basal cells rectangular; costa gen excurrent. Capsule oval-oblong; lid short thick subconic or obtuse; pedicel us. yellowish. Us. not tufted. Smaller than the last. -- Fallow fields and banks. *Eur.* not r. Sweden: Hamnstrœm. France: Bouvet. Greece: Heldreich. *Amer.* r. »U. S.»: Lesq. et Jam.

* **W.Davallii** Smith. — Gymnostomum Sm.; Weisia Kindb.; Pottia minutula Br. eur.

Capsule subovate; teeth none; pedicel reddish. Leaves often rufescent when old. Very small. — *Eur.* not r. Sweden, Switzerl.! *Amer.* r. »U. S.»: Lesq. et Jam.

* **W.mutica** Venturi. — Pottia Vent.; Weisia Kindb.

Leaves with subpercurrent costa. Peristome rudimentary. — Dolomitic rocks r. *Eur.* Switzerl.: Mari.

* **W.commutata** Limpricht. — Pottia Limpr.; Weisia Kindb. »Capsule often inclined; teeth very short. Leaves narrower reflexed, sometimes suboval subobtuse. — Calcareous soil r. *Eur.* Istria: Weiss»: Limpricht.

4.**W.groenlandica** Kindb. in Hedwigia 1897 p. 65.

Leaves suboblong-linear or sublingulate very obtuse, only the uppermost recurved; cells nearly smooth; costa not percurrent. Capsule oblong; lid long-conic much shorter; teeth none; pedicel reddish. — Habit of *W. Starkei.* — Arctic distr. r. *Amer.* Greenl. Silch: Baur 1885, com. Roell.

III. Astomum Hampe (Systegium Schimper).

A. **Leaves channelled not involute.**

a. Leaves with long-excurrent costa, crisped.

5.**W.Levieri** Limpricht. — Astomum Limpr.; Weisia Kindb.

Comal leaves and the outer perichetial long-subulate much larger than in *W. crispa*; inner perichetial short-acuminate much shorter. Capsule globose-oval; pedicel very short; lid rostrate. — Clay soil r. *Eur.* Italy: E. Levier.

b. Leaves with subpercurrent costa.

6.**W.multicapsularis** Smith. — Phascum Sm.; Weisia Mitten.

Lower leaves distant; comal and perichetial larger, long-acuminate subulate, crisped; costa not or slightly excurrent. Capsule subglobose or oval-oblong not much longer than pedicel. — Clay fields r. *Eur.* »Engl.»: Braithwaite.

7.**W.Mittenii** Bruch et Schimper. — Astomum B. S.; Weisia Mitt.

Lower leaves distant; the uppermost larger, subulate, shorter-acuminate than in the last, not or faintly crisped; costa not excurrent. Capsule subglobose; pedicel somewhat longer. — Clay fields and banks r. *Eur.* »Engl.»: Braithwaite.

8.**W.rostellata** Bridel. — Phascum Brid.; Weisia Lindb.

Leaves crowded long-acuminate acute not distinctly subulate, crisped; costa short-excurrent. Capsule oval-oblong; pedicel 2—3 times longer. — On earth r. *Eur.* Engl.: Rogers. France: Sebilles, com. Husnot.

B. Leaves involute gen. carinate and long-acuminate, crisped.

a. Leaves with gen. long-excurrent costa: the lower distant.

9.**W.crispa** Hedwig. — Phascum H.; Weisia Mitten.

Comal and perichetial leaves long-subulate. Capsule subglobose; pedicel shorter; lid us. with short beak. — Clay or sandy soil. *Eur.* not r. Switzerl.! Sweden: Lindberg; S. Hardin. *Amer.* Can.: Drummond n. 11, com. Macoun.

b. Leaves long-acuminate with subpercurrent costa, the lower distant. Capsule with rostellate lid.

10. **W. Sullivantii** Schimper. — Astomum Sch.; Sull. icon. m.; Weisia Kindb.

Capsule globose; pedicel shorter. — Clover-fields r. *Amer.* U. S.: Sullivant, com. C. Mueller; Mohr, com. Macoun.

11. **W. nitidula** Schimper. — Astomum Sch.; Weisia Kindb.

»Capsule ovoid; pedicel much longer. — *Amer.* r. U. S.»: Sullivant icon. m.

* **W. Drummondii** Kindb. — Systegium cat. Can. m.

Capsule subglobose; pedicel 3—4 times longer, nearly emerging above upper leaves. — *Amer.* r. Can.: Drummond, com. Macoun.

c. Leaves crowded: upper long-acuminate, lower short-acuminate; costa subpercurrent. Capsule with thick short obtuse point.

12. **W. Ludoviciæ** Sullivant. — Astomum Sull. ic. m.; Weisia Kindb.

Capsule suboval; pedicel often somewhat longer. — *Amer.* r. »U. S.»: Sullivant.

IV. Hymenostomum R. Brown.

A. Pedicel short. Stem finally decumbent. Leaves not involute.

13. **W. squarrosa** Esenbeck et Hornschuch. — Hymenostomum Es. et Hornsch.; Weisia C. M.

Capsule with somewhat small mouth. Plants very small. — Clay fields and banks r. *Eur.* France: Husnot. Germany: Dreesen.

B. Pedicel elongate. Stem erect. Leaves involute.

14. **W. microstoma** Hedwig. — Gymnostomum H.; Weisia C. M.

Leaves us. not strongly involute above; costa pale faint. Capsule with very small mouth, often asymmetric. — Banks and barren fields. *Eur.* not uncommon. Sweden, Spain etc.!

15. **W. tortilis** Schwægrichen. — Gymnostomum Schw.; Weisia C. M.

Leaves less involute; costa stout finally brown. Capsule symmetric with somewhat wide mouth. — Limestone rocks and walls r. *Eur.* Switzerl.! France: Boulay. Engl.: Rogers.

V. Eu-Weisia.

A. Perichetial leaves obtuse short convolute. Other leaves with not distinctly excurrent costa, not involute.

16.**W.convoluta** C. M. et Kindb. cat. Can. m.

Leaves sublinear-subulate. Capsule gen. narrow; beak shorter. — Crevices of rocks princ. in alps r. *Amer.* Can. Rocky mts 2300 metr. a. sea, Vanc. isl. and Peace river: Macoun.

B. Perichetial leaves acute not convolute. Other leaves with excurrent costa.

17.**W.viridula** L. — Bryum L.; Weisia Hedwig.

Leaves from subovate base acuminate, strongly involute, only the lowest with flat borders; costa pale, papillose at back. Capsule us. suboval with shorter beak; pedicel yellow. — On earth, often on walls and roadsides. *Eur.* common in lower districts. Sweden, Switzerl.! *Amer.* Can.: Macoun; Drummond 67. U. S.: Sullivant, com. C. Mueller.

* **W.longirostris** Kindb. in Hedwigia 1896 p. 59.

Capsule more wide-mouthed, gen. shorter than beak; teeth gen. rudimentary. — *Amer.* r. U. S. Chicago: Roell.

* **W.crispata** Esenbeck et Hornschuch; Gymnostomum Es. et Hsch.; Weisia Juratzka.

Capsule more small-mouthed, suboblong, r. longer than beak; teeth rudimentary. — Clay and calcareous soil. *Eur.* Switzerl.! Sweden: J. Persson.

* **W.longiseta** Lesquereux et James.

Leaves larger, more hyaline at base. Peristomial teeth often cleft. Tufts gen. more dense. — R. *Eur.* Engl.: Rogers. *Amer.* U. S.: Mohr, com. Macoun; Langlois, com. Cardot.

18.**W.Wimmeri** Sendtner. — Gymnostomum Sendt.; Weisia Br. eur.

Differs from *W. viridula* in suboblong leaf-base and paroecious inflorescence. Peristome us. rudimentary. — Earth in alp. regions r. *Eur.* Norway! Switzerl.!; Schimper.

19.**W.rutilans** Hedwig. — Gymnostomum H.; Weisia Lindb.; W. mucronata Br. eur.; W. Wolfii Lesq. et Jam.

Differs from *W. viridula* in nearly all leaves flat at borders. Capsule us. suboval; beak shorter; pedicel orange about 1 c. m. long. — Clay soil r. *Eur.* Engl.: Barnes, com. Bottini. Italy: Roell. *Amer.* Can. Ottawa and Vanc. isl.: Macoun. U. S.: Wolf, com. C. Mueller.

* **W.Ganderi** Juratzka.

Capsule oblong scarcely longer than beak. — *Eur.* r. Switzerl.! France: Philibert.

VI. Hymenostylium Bridel.

20.**W.curvirostris** Ehrhart. — Pottia Ehrh.; Weisia C. M.; Gymnostomum Hedwig.

Leaves long narrowly ovate-lanceolate or sublinear acuminate acute carinate, more or less papillose: the upper sometimes falcate; cells often faintly yellowish or less pellucid, rectangular or subquadrate; the lower basal cells hyaline sometimes rhomboidal. Perichetial leaves costate nearly similar. Capsule red-brown subglobose or obovate; beak longer and oblique. Tufts radiculose often high, sometimes loosely cohering. — Calcareous and schistose rocks princ. in alps. *Eur.* not uncommon. Sweden, Norway, Switzerl.! *Amer.* Can.: Macoun; Waghorne. U. S.: Demetrio, com. Cardot.

21.**W.platyphylla** Kindb. — Gymnostomum Kindb. bull. Torr. club 1889.

Leaves oblong-lanceolate obtusate obtuse nearly smooth concave or channelled, shorter and broader than in the last; cells pellucid somewhat large: the upper subquadrate, the inner basal rectangular hyaline. Perichetial leaves ovate, the inner not or indistinctly costate. Capsules unknown. Tufts not high nearly eradiculose. — Rocks r. *Amer.* Can. Brit. Col. near a waterfall: Macoun.

VII. Gymnostomum Hedwig.

A. Tufts compact. Stem somewhat elongate. Capsule with indistinct or narrow persistent annulus; peristome none; pedicel yellow.

22.**W.rupestris** Schleicher. — Gymnostomum Schl.; Weisia C. M.

Leaves carinate often acuminate, acute or obtuse, not or faintly curved when moist, somewhat long; costa not percurrent. Perichetial leaves nearly similar not sheathing. Capsule oblong finally pale yellow, at least twice longer than the conic beak; annulus none. Tufts often high us. brown-green. — Rocks princ. siliceous. *Eur.* not uncommon. Sweden, Norway, Switzerl.! Engl.: Holt. *Amer.* Can.: Macoun; Waghorne; Drummond 24.

23.**W.calcarea** Esenbeck et Hornschuch. — Gymnostomum Es. et Hornsch.; Weisia C. M.

Leaves channelled or indistinctly carinate above, obtusate or short-acuminate, acute or obtuse, not or faintly curved when moist, not long; costa not percurrent. Perichetial leaves larger and longer with long sheathing base and shorter, attenuate acumen; the inner shorter. Capsule oval-oblong yellowish; lid short with conic beak; annulus narrow. Tufts us. light green mostly encrusted by chalk, lower than in the last. — Calcareous rocks. *Eur.* not uncommon in southern distr. Switzerl.! France: Philibert. Spain: Levier. Italy: Arcangeli. *Amer.* r. Can.: Macoun; Waghorne.

24 **W. falcata** Kindb. bull. soc. bot. ital. 1895.

Differs from the resembling last: Upper leaves distinctly carinate somewhat long-acuminate and gen. acute, falcate when moist; costa gen. percurrent. Inner perichetial leaves long-acuminate not or indistinctly sheathing. Lid of capsule nearly flat. Tufts dark green less compact. — Calcareous rocks r. *Eur.* Italy monte Caprino near Lugano: Roell and Kindb.

B. Tufts loose very low. Capsule minute; annulus us. broad. Leaves channelled. Plants small.

a. Lower leaves not shorter than the upper; cells pellucid, the upper nearly smooth well-distinct.

25. **W. Barbula** Schwægrichen. — Gymnostomum Schw.; Weisia Kindb.; Hyophila Hampe; Pottia C. M.

Leaves not long, obtusate gen. obtuse, not or faintly curved when moist. Perichetial leaves nearly similar not sheathing; the innermost one from short base somewhat narrowed to a long linear obtuse at one side faintly reflexed acumen. Capsule long cylindric; beak short; teeth none; annulus broad loosed in pieces. — Rocky banks of mountain rivulets r. *Amer.* »U. S.: Garber»: Lesq. et Jam. (Cuba: Wright, herb. Sullivant, com. C. Mueller).

b. Lower leaves shorter than the upper; upper cells opake very small. Leaves often curved when moist.

aa. All leaves short; costa not percurrent. Capsule with broad annulus.

26 **W. tenuis** Schrader. — Gymnostomum Schrad.; Weisia C. M.; Gyroweisia Schimper.

Leaves sublingulate arrounded at apex not acuminate. Perichetial leaves larger and longer with long sheathing base and sublinear obtuse shorter acumen. Capsule oblong; lid conic much shorter; teeth none; annulus often revoluble. Stem often with shoots at base; their leaves smaller and shorter. — Limestone and sandstone rocks princ. in warmer districts. *Eur.* less r. Sweden, Switzerl.! France: Lamy. Engl.: Cunliffe. *Amer.* r. Can.: Drummond 21; White, com. Macoun.

* **W.reflexa** Bridel. — Gyroweisia Schimper.

Peristome present us. rudimentary. Leaves more curved. — *Eur.* r. France: Camus, com. Husnot.

27.**W.acutifolia** Philibert. — Gyroweisia Phil.; Weisia Kindb. »Gyroweisia tenuis»: Limpricht.

Leaves not arrounded at apex; the upper sometimes acute, not much longer than the lower. Perichetial leaves acuminate acute. Capsule suboval twice longer than beak; teeth none; annulus revoluble. — Caverns of calcareous rocks r. *Eur.* Switzerl.: Philibert.

28.**W.pusilla** Kindb. revue bryol. 1896. — »Gymnostomum tenue»: Kindb. cat. Canad. m.

Leaves obtusate subacute not arrounded at apex. Perichetial leaves not larger and not sheathing, the inner one subovate shorter. Capsule oblong, not longer than beak; teeth none or rudimentary; annulus not revoluble. Resembles *W. tenuis* in size. — Calcareous rocks r. *Amer.* Can. Owen Sound: Macoun.

bb. Leaves acute; the lower oval very small, the upper very much longer (about 4 m. m.); costa subexcurrent. Annulus of capsule not found.

29.**W.linealifolia** Kindb. — Gyroweisia Kindb. revue bryol. 1892 and Nuovo giorn. bot. ital. 1893.

Upper leaves somewhat broader at base, crenulate-papillose all around; costa subexcurrent. Perichetial leaves from broader base abruptly tapering to a sublinear by costa nearly filled acumen. Capsule oblong-cylindric; teeth none; lid long-rostrate; pedicel pale finally reddish. Stem with shoots at base as in *W. tenuis.* — Calcareous rocks r. *Eur.* Switzerl. in a cavern near Lugano!

119. **Syrrhopodon** Schwægrichen.

1.**S.texanus** Sullivant icon. muscorum.

Leaves hyaline-limbate and serrulate nearly all around, sublinear acute or obtuse; nearly all basal cells large hyaline, the others very small opake; costa with 2 serrate lamellæ near apex. Calyptra scabrous. Peristomial teeth with 2 or 3 articulations. Tufts dark green or blackish. — *Amer.* r. U. S. south. st.: Sawyer, com. Cardot.

2.**S.crispus** Austin. — Calymperes Lesq. et Jam.

»Leaves hyaline-limbate in lower part, papillose-crenulate above, narrowly panduriform or lingulate, obtuse; basal cells larger, the upper very small. Tufts compact yellowish green, brown inside. — *Amer.* r. U. S. Florida»: Lesq. et Jam.

3.**S.floridanus** Sullivant icon. musc.

Leaves not limbate, entire at the lower part of sheath, papillose-crenulate in its upper part, narrowly ovate-lanceolate, tapering to the subobtuse apex; upper lamina furnished with 2 serrate lamellæ at each border; the most cells small dusky, only the lower basal large hyaline; costa papillose, not serrate, at back. Calyptra smooth. Peristomial teeth with 5—6 articulations. Pedicel of capsule shorter than in the last. Tufts brown-green. — Decayed logs r. *Amer.* r. U. S. south. st.: Fitzgerald, com. Renauld.

120. **Dialytrichia** (Schimper as subgenus) Limpricht.

1.**D.Brebissoni** Bridel. — Barbula Brid.; Dialytrichia Limpr.; Cinclidotus Husnot; Tortula mucronata Lindb.

Leaves broad somewhat long sublinear or sublingulate round-obtuse carinate with thickened borders above the hyaline slightly reflexed base; upper cells papillose subquadrate, the basal rectangular hyaline or faintly colored; costa thick short-excurrent. Capsule suboblong; lid rostellate much shorter; teeth short reddish papillose scarcely once contorted; basal tube short; pedicel yellowish red. Stem branched 2—5 c. m. high us. erect. Tufts large dark green or dirty brownish. Habit of *Cinclidotus riparius.* — Base of trees near rivers or stones in rivulets r. *Eur.* Italy! France: Husnot. Belgium: Roemer. Spain: Bolos, com. Venturi.

2.**D.cancellata** C. M. — Barbula C. M.; Dialytrichia Kindb.

Differs from the last: »Leaves yellowish green; stem nearly simple. Capsule cylindric; lid scarcely shorter; teeth smooth; calyptra very rough. — *Amer.* r. U. S. Texas: Boll»: C. M. in Flora 1873.

121. **Cinclidotus** Beauvois.

A. Leaves narrow long sublinear or nearly subulate, falcate when moist.

1.**C.aquaticus** Jacquin. — Hypnum Jacq.; Cinclidotus Br. eur.

Leaves crowded entire channelled narrowed from base, faintly curved when dry; nearly all inner cells subquadrate faintly pellucid, the marginal short-rectangular; costa thick sublinear excurrent to a thick smooth point, occupying about $^1/_4$ of lamina at base. Capsule oblong brown; lid subconic often nearly as long; teeth brittle partly loosed with difficulty; pedicel short-exserted. Tufts brown or dark green. Stem naked below and much branching, often very long to 50 c. m. — Rivulets. *Eur.* southern distr. somewhat r. Switzerl.!, Schimper. Austria: Venturi. Italy: Arcangeli. Germany: Kolb.

2.**C.falcatus** Kindb. revue bryol. 1887.

Differs from the last: Leaves less crowded and dark green, distinctly falcate also when dry; cells opake very chlorophyllose; costa broader and gradually narrowed, occupying at least $^1/_3$ of lamina at base, much narrower at apex and gen. not excurrent. Stem not naked below, divided in long branches. Capsules unknown. — Springs r. *Eur.* Greece: Heldreich.

B. Leaves broad obtusate or broadly acuminate, patent when moist; lower cells short rectangular.

3.**C.riparius** Host- — Gymnostomum Host; Cinclidotus Arnott.

Leaves concave entire sublinear-oblong or sublingulate gen. obtusate obtuse; upper cells smooth. Capsule oblong; teeth yellowish rudimentary; pedicel short-exserted. Stem 2—8 c. m. long sparingly branching often erect. Tufts blackish. — Stones princ. in rivers, r. *Eur.* Germany: Holler. France: Guépin, com. Husnot. Sweden: P. Olsson. Spain: Dieck, com. Roell.

4.**C.fontinaloides** Hedwig. — Trichostomum H.; Cinclidotus Beauvois.

Leaves carinate sometimes denticulate at apex, ovate-oblong or broadly ovate-lanceolate acuminate gen. acute; upper cells sometimes faintly papillose. Capsule oval nearly immersed; teeth reddish. Stems fasciculate often to 10—15 c. m. long with numerous short branchlets. Tufts olivaceous or brown. — Stones in springs and rivulets *Eur.* not r. in lower warmer districts, r. in alps. Sweden, Switzerl., Italy! *Amer.* r. »Can.: **Macoun»: Lesq. et Jam.**

Fam. 25. Calymperaceæ.

122. **Calymperes** Swartz.

1.**C.Richardi** C. Mueller.

»Leaves yellow-limbate at least in lower part, suboblong obtuse; costa not excurrent. Calyptra slightly scabrous. Tufts loose»: C. M. — Trees r. *Amer.* »U. S. Florida»: Lq. et Jam.

2.**C.disciforme** C. Mueller.

»Leaves yellow-limbate suboblong; costa excurrent. Calyptra very scabrous. Tufts pulvinate. Barren branches with short crowded leaves»: C. M. — *Amer.* r. »U. S. Florida»: Lq. et Jam.

Fam. 26 Encalyptaceæ.

123. **Encalypta** Schreber.

A. Peristome double. Pedicel red.

I. **Streptotheca.** Capsule finally twisted, r. distinctly necked, more or less ribbed; teeth red; endostome yellow; calyptra very long, fringed below. Leaves limbate cucullate lingulate.

II. **Diplolepis.** Capsule necked, neither twisted nor sulcate; endostome rudimentary adhering to teeth; calyptra us. fringed when young. Leaves not limbate.

B. Peristome simple or wanting. Monoecious.

a. Leaves not recurved. Capsule without distinct defluent neck; pedicel red.

III. **Rhabdotheca.** Capsule greenish or pale yellowish, sulcate when dry, often red-ribbed; peristome often present; calyptra not long, r. fringed. Leaves often limbate.

IV. **Pyromitrium.** Capsule pale brown not sulcate; peristome none; calyptra long, often fringed when young. Leaves limbate.

b. Capsule more or less distinctly necked; pedicel yellow in younger state. Leaves recurved.

V. **Xanthopus.** Capsule reddish r. sulcate, not ribbed; peristome us. present. Leaves not distinctly limbate.

I. Streptotheca Kindb.

A. Capsule very much twisted also when unripe. Leaves obtusate obtuse; costa hispid above at back, not excurrent. Spores about 0,01 m. m.

1.**E.contorta** Wulfen. — Bryum Wulf.; Encalypta Lindb.; E. streptocarpa Hedwig.

Outer perichetial leaves from broad base abruptly tapering to a long sublinear obtuse acumen; the inner shorter with short acute acumen. Pedicel faintly rough. Calyptra hispid at beak. Sterile stems often with propagula. Dioecious r. fruiting. — Rocks princ. calcareous. *Eur.* not uncommon. Sweden, Norway, Switzerl.! Austria: C. E. Kindberg. *Amer.* Can.: Macoun.

2.**E.cucullata** C. M. et Kindb. l. c.

Perichetial leaves gradually long-acuminate acute with long hairpoint. Pedicel smooth. Calyptra hispid on the whole surface. Stem without propagula. Monoecious. — Crevices of alp. rocks r. *Amer.* Can. Brit. Col.: Macoun.

B. Capsule faintly twisted, straight when unripe; pedicel smooth; calyptra hispid at beak. Upper leaves acute; costa smooth often excurrent. Spores 0,02 m. m. Monoecious.

3.**E.procera** Bruch.

Upper leaves gen. acute, sometimes with hairpoint; the perichetial subovate short-acuminate us. with hairpoint. Capsule without distinct neck; teeth us. shorter than endostome. —

Schistose rocks in alp. region r. *Eur.* Norway! *Amer.* Can.: Macoun; Drummond 48.

4.**E.Selwyni** Austin.

Leaves more recurved than in the last; the upper and perichetial longer-acuminate with long hairpoint. Capsule sometimes with distinct neck and more twisted; endostome less papillose, as long as teeth. — Alp. rocks r. *Amer.* Can. Pacif. distr.: Macoun. U. S.: Roell.

II. Diplolepis Kindb.

A. Capsule not or scarcely longer than neck.

5.**E.longicolla** Bruch; Husnot m. Gall.

Leaves long narrow sublinear-lingulate obtuse or acute, concave not recurved; costa excurrent to a short yellowish point. Perichetial leaves long, the inner not smaller, with long whitish hairpoint. Capsule brown with red neck; teeth purplish. Spores 0,05—0,09 m. m. Calyptra long fringed nearly glabrous. — Calcareous soil in alp. region r. *Eur.* »Austria, Switzerl., Germany»: Schimper.

B. Capsule much longer than neck.

a. Leaves long narrow sublinear-lingulate; the perichetial ovate-oblong. Calyptra long hispid fringed when young.

6.**E.affinis** Hedwig fil.; Lindb. — E. apophysata Esenbeck et Hornschuch.

Leaves more or less acuminate often acute, not or indistinctly recurved; costa short-excurrent not piliform at apex. Capsule brownish; teeth pale red. Spores about 0,02 m. m. — Alp. rocks r. *Eur.* Switzerl.! Sweden: Aongstrœm. Austria: Breidler.

7.**E.longipes** »Mitten»: C. M. in herb. — »E. Macounii»: Britton.

Leaves gen. obtusate, distinctly recurved nearly all around; costa not excurrent. Capsule reddish brown; teeth brown-yellow. Spores about 0,03 m. m. — Clay banks in alp. region r. *Amer.* Can. Rocky mts 2250 metr. a. sea: Macoun; Drummond 50 c, com. C. Mueller.

b. Leaves somewhat broad and not long, oblong-lingulate or shorter; the perichetial us. subovate r. suboblong.

aa. Leaves distinctly recurved nearly all around; costa not excurrent without hairpoint.

8.**E.leiocarpa** Kindb. cat. Canad. m.

Leaves oblong-lingulate obtuse. Capsule brownish; teeth brown-yellow; calyptra faintly rough, not fringed. Spores about 0,02 m. m. — Alp. rocks r. *Amer.* Can. Brit. Col. 1800—1850 metr. a. sea: Macoun.

bb. Leaves not or indistinctly recurved; costa long-excurrent with hairpoint.

9.**E.brevicolla** Bruch.

Leaves oblong-lingulate acute sometimes slightly recurved, often serrate at apex, very concave; hairpoint whitish. Capsule red; neck distinct; teeth whitish; calyptra short glabrous fringed when young. Spores about 0,03 m. m. — Schistose rocks in alp. regions in northern districts r. *Eur.* Norway! Sweden: E. Adlerz.

10.**E.subbrevicolla** Kindb. n. sp.

Leaves oblong-lingulate obtusate undulate not recurved, entire gen. obtuse; hairpoint whitish. Perichetial leaves suboblong acuminate. Capsule brownish with very short neck; teeth whitish when moist, pale reddish when dry; calyptra somewhat long with hispid beak, fringed when young. — *Amer.* r. Can. northern Labrador: Macoun 1896.

11.**E.labradorica** Kindb. n. sp.

Leaves subovate obtuse or subacute entire not recurved; hairpoint whitish or at base yellowish. Capsule brownish with distinct neck; teeth brown-yellow; calyptra short faintly rough not fringed. — *Amer.* r. Can. northern Labrador: Macoun 1896.

III. Rhabdotheca C. Mueller.

A. Leaves not distinctly limbate.

12.**E.exstinctoria** Swartz. — Mnium Sw. 1781; Encalypta Sw. 1799; Leersia vulgaris Hedwig 1787; Encalypta Hoffm. 1795.

Leaves short subspathulate us. obtuse sometimes apiculate; costa not or r. excurrent with short hairpoint, us. without hairpoint. Capsule red-mouthed not ribbed, finally sulcate when dry; teeth wanting or rudimentary; pedicel elongate. Calyptra pale yellow not fringed, more or less hispid. Spores about 0,03 m. m. Tufts green low, radiculose only at base. — Clay or sand on walls and rocks. *Eur.* common at least below alps. Sweden! Italy: Arcangeli. Greece: Heldreich. *Amer.* r. Can.: Macoun; Waghorne.

***E.tenella** Kindb. in Hedwigia 1896 p. 65.

Leaves shorter, suboval gen. arrounded at apex sometimes with long hairpoint. Capsule small; teeth wanting; pedicel not much emergent. Calyptra whitish nearly smooth very small. Plants very small. — *Amer.* r. U. S. Montana: Roell.

B. Leaves limbate below.

a. Tufts dense very radiculose, brown below, often high.

13.**E.rhabdocarpa** Schwægrichen.

Leaves suboblong or oblong-lanceolate obtusate us. subacute; costa often excurrent sometimes piliferous. Capsule us. red-ribbed and oblong-cylindric; teeth orange or purplish. Calyptra short hispid not fringed. Spores 0,04—0,05 m. m. — Calcareous and schistose rocks. *Eur.* common in alps. Sweden (also below alps), Norway, Switzerl.! *Amer.* Can. not r.: Macoun.

* **E.leiomitra** Kindb. cat. Canad. m.

Capsule short suboblong; teeth nearly blunt; calyptra glabrous. Leaves short-lingulate; costa subpercurrent. Tufts low. — *Amer.* r. Can.: J. M. Macoun.

* **E.leptodon** Bruch. — Leersia rhabdocarpa *leucodontea Kindb. Laubm. Schwed. u. Norw.

Capsule less distinctly ribbed: teeth whitish often rudimentary or wanting. Leaves suboblong; costa not excurrent without hairpoint. — Rocks. *Eur.* not common. Norway! Sweden: M. Huss. Switzerl.: Roell.

b. Tufts less dense, radiculose only at base, green and not high. Costa of upper leaves long-excurrent with hairpoint.

14.**E.spathulata** C. Mueller.

Leaves oblong-spathulate us. obtuse. Peristome none. Calyptra fringed nearly glabrous. Capsule more or less sulcate. Spores 0,03—0,04 m. m. — Stones and walls r. *Eur.* Sweden! Austria Transsilvania: Barth, com. C. Mueller.

15.**E.subspathulata** C. M. et Kindb. l. c.

Leaves spathulate-lingulate obtuse. Capsule not ribbed, faintly sulcate when dry; teeth pale high or partly incomplete and membranose. Calyptra hispid above, not fringed. Spores 0,04—0,05 m. m. Tufts low not dense. — Earth r. *Amer.* Can. Brit. Col.: Macoun.

IV. Pyromitrium Wallroth.

16.**E.alpina** Smith 1805. — E commutata Esenbeck et Hornschuch 1827.

Leaves deeply impressed at both sides above the short erect nearly sheathing base, sublingulate acute more or less attenuate; costa often excurrent. Perichetial leaves us. piliferous. Calyptra brownish glabrous. Spores 0,03—0,04 m. m. Tufts tomentose often high and brown. — Alp. rocks. *Eur.* common in northern districts, otherwhere r. Norway! *Amer.* r. Can. Rocky mts: Drummond 49.

V. Xanthopus Kindb.

A. Capsule not sulcate.

17.**E.ciliata** Hedwig. — Leersia H.; Encalypta Hoffmann.

Leaves lingulate subacute not long; costa nearly smooth at back, often excurrent to a yellowish point. Capsule with short less distinct neck and pale mouth; teeth orange erect when moist, appressed to mouth when dry, faintly papillose and us. brittle. Calyptra fringed also when old, us. glabrous r. rough at beak. Spores about 0,03 m. m. — Earth and stones also in alps. *Eur.* common. Sweden, Norway, Switzerl.! *Amer.* »Greenl.»: Berggren.

* **E.microstoma** Balsamo et Notaris.

»Capsule with narrow mouth and distinct neck; teeth irregular us. wanting. — Earth in alps r. *Eur.* Austria; Switzerl.»: Limpricht.

18.**E.Macounii** »Austin»: Macoun. — Leersia borealis Kindb. Laubm. Schwed. u. N.

Leaves gen. narrowly lingulate; costa longer-excurrent than in the last. Capsule with distinct often somewhat long neck and brown mouth; teeth brown-red or red, erect when dry, appressed to mouth when moist, distinctly papillose and not brittle. Calyptra as in the last. Spores about 0,04 m. m. — Rocks. *Eur.* in alp. regions not common. Norway! Switzerl.: Husnot m. Gall.; H. Forssell. *Amer.* Can. not r.: J. Macoun (also original specimen determined by Austin). Alaska: J. M. Macoun. U. S.: Roell.

B. Capsule distinctly sulcate when dry.

19.**E.alaskana** Kindb. cat. Canad. m.

Leaves short subobovate subobtuse; costa nearly smooth, scarcely excurrent. Capsule with very short neck and brown mouth; teeth as in the last. Spores about 0,02 m. m. Calyptra not seen. — Arctic district r. *Amer.* Alaska: J. M. Macoun.

124. Merceya Schimper.

1.**M.ligulata** Spruce. — Encalypta Spruce; Merceya Schimp.

Leaves lanceolate-lingulate cucullate arrounded at apex, reflexed below but not limbate, not or indistinctly papillose; upper cells small round-quadrate, the basal rectangular; costa not excurrent. Capsule oblong; teeth none; pedicel long. Stem simple or bifurcate. Tufts dense, brownish below, yellow-green at the tips, 2—4 c. m. high. — Wet rocks r. *Eur.* France: Renauld; Jeanbernat. Austria: Breidler.

2.**M.latifolia** Kindb. bull. Torr. club XVI.

Leaves broadly spathulate-lingulate obtusate obtuse or subacute, slightly reflexed near base, broadly limbate by orange-colored larger cells, smooth; other cells as in the last; costa percurrent or scarcely excurrent. Capsules unknown. Stem divided. Tufts dense, brown-ferruginous below, green at the tips, about 3 c. m. high. Habit of *Barbula ruralis.* — Wet rocks r. *Amer.* Pacif. distr. Can. Vanc. isl. »U. S. Calif.« C. M. herb.

Fam. 27. Orthotrichaceæ.

125. **Orthotrichum** Hedwig.

A. Stomata of capsule superficial.

a. Leaves partly or wholly involute, not carinate. Dioecious.

I. **Coelophyllum.** Leaves short concave obtuse; cells gen. short. Capsule immersed sulcate strangulate when dry; calyptra scabrous; teeth reflexed when dry, broader than the cilia.

b. Leaves gen. carinate and recurved nearly all around, not crisped. Monoecious or (*O. exiguum*) dioecious.

II. **Dorcadion.** Capsule r. strangulate; calyptra us. hairy.

aa. Capsule narrow subcylindric not distinctly constricted, us. exserted.

1. **Speciosa.** Capsule nearly smooth at least when young; cilia narrow; teeth us. opake and connate in pairs. Leaves carinate gen. long.

bb. Capsule thick oval-oblong strangulate and sulcate, us. immersed; cilia narrow.

2. **Arctica.** Leaves short often subcanaliculate, us. obtuse.

3. **Affinia.** Leaves long carinate us. acute.

cc. Capsule thick suboval not strangulate.

4. **Rupestria.** Capsule immersed or emergent, more or less sulcate; teeth erect or patent when dry, joined in pairs but us. subpartite; cilia narrow. Leaves long carinate.

5. **Leiocarpa.** Capsule wholly or partly immersed, not sulcate; cilia very broad; teeth not connate. Leaves sometimes short and nearly flat at borders.

c. Leaves faintly or not carinate, partly recurved or wholly flat at borders, us. long and crisped. Sometimes dioecious.

III. **Lyellina.** Capsule us. immersed; cilia somewhat broad. Leaves not or faintly crisped; alar cells not hyaline. Dioecious, often (in Europe) with propagula when sterile.

IV. **Ulota.** Capsule exserted; cilia narrow. Leaves more or less distinctly crisped; alar cells mostly pluriseriate and hyaline. Tufts us. pulvinate. Monoecious.

V. **Pseud-Ulota.** Capsule exserted; cilia narrow. Leaves strongly crisped; hyaline alar cells uniseriate or indistinct. Tufts pulvinate. Dioecious very r. fruiting, often with propagula when sterile.

B. Stomata of capsule immersed.

VI. **Calyptoporus.** Capsule often strangulate; cilia us. subfiliform. Leaves more or less recurved, gen. not crisped. Monoecious.

a. Leaves partly flat at borders. Plants gen. small.

1. **Psilocarpa.** Capsule immersed thick neither sulcate nor strangulate. Leaves not crisped.

2. **Microcarpa.** Capsule immersed thick sulcate us. strangulate. Leaves not crisped.

3. **Pulchella.** Capsule narrow subcylindric sulcate not distinctly strangulate, us. exserted. Leaves more or less crisped.

b. Leaves recurved nearly all around, not crisped. Capsule sulcate.

aa. Leaves with hyaline hairpoint.

4. **Diaphana.** Capsule immersed not strangulate. Plants small.

bb. Leaves without hairpoint.

5. **Rivularia.** Capsule immersed. Leaves channelled short broadly obtuse; cells large thin-walled, the upper polygonal; costa abbreviate. Plants gen. large, growing in or near water, r. fruiting.

6. **Cupulata.** Leaves carinate long gen. acuminate acute; upper cells small rotundate thick-walled; costa gen. percurrent. Capsule sometimes not strangulate; teeth not appressed to it. Plants often large, growing on rocks or less often on trees.

7. **Pumila.** Leaves more or less distinctly carinate often obtuse; upper cells small rotundate thick-walled; costa gen. percurrent. Capsule us. strangulate; teeth appressed to it when dry. Plants small us. pulvinate, growing on trees or less often on rocks.

I. Coelophyllum Kindb.

A. Capsule with nearly as long neck; teeth orange.

1.**O. obtusifolium** Schrader.

Leaves ovate-oblong obtusate not involute at apex, also the perichetial; costa pellucid not percurrent. — Trees and roofs. *Eur.* common. Sweden, Norway, Switzerl.! *Amer.* not common. Can.: Macoun.

2.**O. inflexum** C. Mueller syn. — »O. brachytrichum Schimper»: Lesq. et Jam. ?

Leaves narrower than in the last and less obtusate or subacute subinvolute nearly all around; cells larger; costa shorter, sometimes ceasing far below apex. — Trees r. *Amer.* Can.: Macoun.

B. Capsule with short neck; teeth wanting.

3.**O.gymnostomum** Bruch.

Leaves subovate-oval obtusate obtuse involute all around; costa subpercurrent brown opake. Perichetial leaves narrower sometimes acute. — Trees princ. *Populus tremula* r. *Eur.* Sweden not uncommon, Norway! *Amer.* Can.: Waghorne.

II. Dorcadion Adanson; Lindberg.

1. Speciosa.

A. Capsule short-emergent; pedicel very short; teeth free or slightly connate at base.

4.**O.Bolænderi** Sullivant icon. muscor.

Leaves ovate-lanceolate short-acuminate subacute, faintly recurved below, flat above, faintly papillose, appressed when dry, falcate when moistened. Capsule short-necked, smooth when young finally sulcate; teeth yellowish appressed when dry; calyptra hairy. Tufts about 3 c. m. high. — Rocks r. *Amer.* »U. S.»: Sullivant.

5.**O.psilothecium** C. M. et Kindb. l. c.

Differs from the last: Leaves shorter often obtuse or obtusate, recurved nearly all around, less papillose, not appressed when dry. Peristomial teeth not connate. Calyptra finally glabrous. Tufts 1—2 c. m. high. Capsule greenish as in *O. affine.* — Trees r. *Amer.* Can.: Macoun. U. S. Oregon: Roell.

B. Capsule exserted gen. long-emergent; teeth connate in pairs.

a. Càpsule arrounded below, not defluent to the short neck.

6.**O.lævigatum** Zetterstedt. — O. rhabdophorum Venturi ?

Leaves broadly ovate-lanceolate short-acuminate not subulate. Capsule brown us. wholly smooth; pedicel longer. Tufts dark green or blackish not high. — Alp. rocks r. *Eur.* Norway: J. E. Zetterstedt; I. Hagen. — *Amer.* Can. Pacif. distr.: Macoun.

b. Capsule defluent to the long neck.

aa. Capsule not or very faintly sulcate when old.

7.**O.Kingii** Lesquereux; Sullivant icon. m.

Leaves as in the last but nearly appressed when dry. Capsule longer or shorter than pedicel; teeth whitish erect when dry; calyptra hairy. Tufts as in the last, 1—2 c. m. high. — Rocks r. *Amer.* Can. Brit. Col.: Macoun. U. S.: Henderson, com. Cardot.

bb. Capsule us. distinctly sulcate when old.

8.**O.speciosum** Esenbeck.

Leaves ovate-lanceolate subulate-acuminate or r. subobtuse at apex, not or r. appressed when dry, falcate when moistened. Capsule pale brown when ripe; teeth whitish or pale yellow, us. appressed to it when dry; cilia not sinuous; pedicel shorter than capsule; calyptra hairy. Tufts us. pale or yellowish green; stem us. long. — On trees or less often on stones. *Eur.* common, but r. in alp. regions. Sweden, Norway, Switzerl.! *Amer.* Can.: Macoun; Waghorne.

* **O.elegans** Schwægrichen.

Capsule pale or greenish; teeth pale yellow; calyptra nearly glabrous. Tufts 1—2 c. m. high. — *Eur.* r. »Finl.»: Lindberg. *Amer.* »U. S.»: Cardot. (*Asia*, Sibiria: H. W. Arnell).

9.**O.Roellii** Venturi.

Differs from *O. speciosum:* Capsule longer exserted shorter than pedicel; teeth pale yellow erect when dry. — Rocks r. *Amer.* U. S.: J. Roell.

* **O.stenocarpum** Venturi. — O. lonchothecium C. M. et Kindb.

Capsule less distinctly sulcate; teeth often smooth. Leaves dark green nearly appressed when dry. — Rocks r. *Amer.* Can.: Macoun. U. S.: Roell.

* **O.Schlotthaueri** Venturi.

Capsule longer than pedicel; teeth sometimes appressed when dry. — Rocks r. *Amer.* U. S.: Roell.

10.**O.Killiasii** C. Mueller.

Leaves ovate-lanceolate shorter and shorter-subulate than in *O. speciosum,* appressed when dry, not falcate when moist. Capsule faintly sulcate; teeth yellowish erect when dry; cilia sinuous; pedicel shorter than capsule; calyptra finally glabrous. Tufts brown 1—3 c. m. high. — Alp. rocks r. *Eur.* Norway, Switzerl.! *Amer.* U. S.: Roell.

2. Arctica.

11.**O.Pylaisii** Bridel; C. M. syn. — O. Breutelii Hampe; O. Blyttii Schimper.

Leaves ovate-oblong or broadly ovate-lanceolate more or less obtuse, narrowly or slightly reflexed, faintly open when moistened; cells gen. short. Capsule suboval; teeth not or faintly perforate; cilia short or rudimentary; calyptra hairy.

Leaves short us. faintly papillose; costa subpercurrent. Capsule exserted distinctly sulcate; teeth opake; pedicel long. Tufts olive-green or brown. — Rocks near sea in northern princ.

arctic distr. r. *Eur.* Norway: E. Nyman; I. Hagen. Spetsbergen: Berggren. *Amer.* Greenl.: Berggren. Can.: Waghorne.

* **O.brevinerve** Lindberg.

»Leaves nearly smooth; costa abbreviate. Tufts brown. — *Eur.* r. Finl.»: Lindb. musci scandin.

* **O.Sommerfeltii** Schimper.

Leaves longer nearly smooth; costa subpercurrent. Tufts green or yellowish green. — *Eur.* r. Norway: W. Baur; Arnell.

* **O.microblephare** Schimper.

»Leaves broadly ovate-lanceolate distinctly papillose; costa subpercurrent. Capsule faintly sulcate; teeth smooth above; pedicel short. Tufts blackish. — *Eur.* r. Finl.»: Lindb. l. c.

* **O.arcticum** Schimper.

Leaves as in the last. Capsule faintly sulcate not wholly exserted; teeth opake; pedicel short. Tufts blackish or dark green. — *Eur.* r. Norway: Zetterstedt; W. Baur. Russia: Brotherus.

* **O.groenlandicum** Berggren.

»Differs in peristomial teeth separated not connate in pairs. *Amer.* r. Greenl.»: Berggren.

12.**O.sordidum** Sullivant et Lesquereux; Sull. icon. m.

Leaves ovate-oblong or broadly ovate-lanceolate gen. acute sometimes short-acuminate, faintly papillose and broadly recurved, open when moistened; inner basal cells narrow. Capsule broad-oval or subpiriform immersed or nearly exserted; teeth opake perforate above; cilia long; calyptra sparingly hairy; pedicel very short. Tufts dusky green about 1 c. m. high. — Trees r. *Amer.* Can.: Macoun.

3. Affinia.

13.**O.affine** Schrader.

Leaves ovate-lanceolate us. subulate-acuminate and very papillose. Capsule oblong yellowish green defluent to the long neck; teeth pale perforate (fenestrate) above, finally appressed; pedicel very short; calyptra sparingly hairy. Tufts green us. 2—3 c. m. high. — On trees r. on stones. *Eur.* common. Sweden, Switzerl.! *Amer.* r. Can.: Macoun.

* **O.fastigiatum** Bruch. — O. neglectum and O. appendiculatum Schimp.

Leaves shorter-acuminate less papillose. Capsule suboval; calyptra nearly glabrous. Tufts us. pulvinate and about 1 c. m. high. Habit of *O. pumilum.* — Trees. *Eur.* not uncommon. Sweden, Switzerl.! Germany: Warnstorf.

* **O.acuminatum** Philibert.

Capsule more abruptly narrowed below, sometimes suboval; teeth rudimentary. — Trees r. *Eur.* France: Philibert. Italy: Venturi.

* **O.præmorsum** Venturi.

Leaves less papillose. Capsule oval; teeth often rudimentary, deflexed when evolute; calyptra hairy. Stem 2—3 c. m. high. Rocks r. *Amer.* U. S.: Roell.

4. Rupestria.

14.**O.rupestre** Schleicher.

Leaves ovate-lanceolate often rigid, us. faintly papillose and not subulate-acuminate. Capsule brown gradually narrowed below, us. immersed; pedicel us. shorter; teeth yellowish. Tufts us. brown or blackish and not high. — Us. growing on rocks. *Eur.* common. Sweden, Norway, Switzerl.! Austria: Venturi. *Amer.* Can.: Macoun.

* **O.Franzonii** Notaris.

Tufts green. Leaves less rigid. — On trees and rocks r. *Eur.* Switzerl.!

* **O.Sturmii** Hornschuch.

Leaves longer acuminate subcanaliculate. Capsule arrounded below; teeth paler. Tufts us. blackish. — Rocks not common. *Eur.* Sweden, Norway, Switzerl.! France: Husnot. *Amer.* Can.: Macoun.

15.**O.texanum** Sullivant icon. muscor.

Differs from *O. rupestre *Sturmii*: Leaves distinctly carinate and less rigid, sometimes nearly subulate; basal cells orange. Peristomial teeth dark yellow or orange. Tufts us. brown-green. Stem often very long. — Rocks r. *Amer.* Can. Pacif. distr.: Macoun.

16.**O.Douglasii** Duby; Lesq. et Jam.

Leaves ovate lanceolate long-acuminate subsubulate very papillose not rigid. Capsule pale brown nearly exserted, arrounded below, nearly smooth when young; teeth erect whitish or pale; pedicel somewhat long. Tufts yellowish green; stem often long. — Alp. rocks r. *Amer.* Pacif. distr. Can. Brit. Col.: Macoun. U. S.: Roell.

5. Leiocarpa.

17.**O.leiocarpum** Br. eur. — O. striatum (Hedw.) Bridel.

Leaves ovate-lanceolate subulate-acuminate carinate us. long. Capsule brown-yellow suboval or oval-oblong quite smooth; neck not distinct; teeth opake finally appressed, orange in younger state; cilia yellowish narrower; calyptra not densely hairy. Tufts green or yellowish green 2—4 c. m. high. — On trees r. on rocks. *Eur.* not r. Sweden, Norway, Switzerl.! *Amer.* r. Can.: Drummond 154.

* **O.Shawii** Wilson.

Capsule yellowish; teeth pale; cilia unknown. Leaves with shorter costa. Tufts dark green 1—2 c. m. high. — On trees r. *Eur.* Switzerl.! France: Philibert.

18.**O.exiguum** Sullivant icon. muscor.

Leaves small short gen. ovate-oblong, sometimes broadly ovate-lanceolate or sublinear, obtusate or short-acuminate gen. obtuse, often nearly wholly flat or slightly reflexed at borders; cells gen. short; costa subpercurrent or shorter. Capsule oval faintly striate when old; neck none or indistinct; cilia whitish broader than teeth; calyptra nearly glabrous; stomata ? Tufts small green about 0,4 c. m. high. Dioecious. — Base of trees r. *Amer.* U. S. Nat. Park: Roell.

III. Lyellina Kindb.

A. Capsule immersed; pedicel indistinct. Leaves nearly appressed when dry not flexuous, with numerous propagula.

19.**O.Lyellii** Hooker et Taylor.

Leaves narrowly ovate-lanceolate subulate-acuminate nearly flat at borders. Capsule suboblong pale brown; cilia reddish; calyptra sparingly hairy. Tufts dark green not high. Often sterile. — On trees. *Eur.* not r. below alp. regions. Sweden, Germany, Switzerl.! Greece: Orphanides. (*Amer.* »U. S.»: Lesq. et Jam.)

B. Capsule more or less emergent; pedicel distinct. Leaves without propagula, the upper us. flexuous or crisped.

20.**O.papillosum** Hampe. — O. Pringlei C. M.

Leaves as in the last but longer and recurved at least at one side to the greater part, more papillose also below. Capsule longer, subcylindric brown and partly emergent. Stem us. higher. Tufts us. yellowish or bright green. — Trees and rocks. *Amer.* not r. Can.: Macoun. U. S. Calif.: Mrs L. C. Feely.

* **O.strictum** Venturi.

Leaves dark green shorter, appressed when dry. — *Amer.* r. Can.: Macoun.

21.**O.lyellioides** Kindb. revue bryol. 1896.

Leaves long as in *O. papillosum*, nearly flat or undulate at borders, faintly papillose, not appressed when dry; the upper crisped. Capsule narrow-cylindric pale brown nearly wholly exserted; pedicel somewhat long. Tufts dark green, blackish below, somewhat high. — Trees and rocks r. *Amer.* Can. Vanc. isl.: Macoun.

IV. Ulota Mohr.

A. Leaves not or indistinctly crisped; hyaline alar cells gen. uniseriate or indistinct.

a. Leaves longish not twisted; nearly all cells short.

22.**O.americanum** Beauvois. — Ulota Hutchinsiæ (Smith) Hammar.

Leaves more or less recurved princ. at base, broadly ovate-lanceolate gen. subobtuse at apex. Capsule thick piriform; calyptra densely hairy. Tufts green or blackish. — On rocks or r. on trees. *Eur.* common. Sweden, Norway, Switzerl.! *Amer.* Can.: Macoun; Waghorne.

23.**O.subulatum** C. M. et Kindb. — Ulota C. M. et K. l. c.

Leaves not recurved, ovate-lanceolate subulate-filiform at apex, nearly appressed when dry. Capsule small narrow-clavate. Tufts dark green or blackish. — Trees r. *Amer.* Can. Brit. Col.: Macoun.

b. Leaves short faintly twisted when dry; basal cells long.

24.**O.Barclayi** Mitten. — Ulota Mitt.; Sulliv. icon. m.; Orthotrichum Kindb.

Leaves gen. ovate-oblong subacute, not or faintly recurved below, flat to the greater part. Capsule subobovate thicker than in *O. americanum*; calyptra sparingly hairy. Tufts brown-green. — In alp. princ. arctic districts r. *Amer.* Alaska: J. M. Macoun. U. S.: Roell.

B. Leaves long very crisped; hyaline alar cells gen. indistinct.

25.**O.megalosporum** Venturi. — Ulota Vent.; Orthotrichum Kindb.; Ulota subulifolia C. M. et Kindb. l. c.

Leaves recurved at base, subulate-piliform at apex; upper cells rotundate, the basal long. Capsule small short-obovate sulcate finally subcylindric; pedicel long thin; calyptra nearly glabrous. Stem often creeping. — Trees r. *Amer.* Pacif. distr. Can.: Macoun. U. S.: Roell.

C. Leaves more or less crisped; hyaline alar cells in several rows.

a. Capsule gen. not wholly exserted; pedicel short. Leaves long distinctly papillose nearly opake; nearly all cells short.

26.**O.connectens** Kindb. in Ottawa Natur. IV, 64. — Ulota camptopoda Kindb. cat. Canad. m.

Leaves recurved below, often subulate at apex, very crisped; alar cells in straight transverse rows. Capsule small obovate not constricted; pedicel often curved or geniculate in younger state. — Trees r. *Amer.* Can.: Macoun.

b. Capsule long-exserted; pedicel long. Inner basal leaf-cells long

aa. Leaves not long with long cylindric papillæ, faintly crisped; alar cells short-rectangular. Calyptra densely hairy.

27.**O.curvifolium** Wahlenberg. — Ulota Bridel.

Leaves obtusate acute or subobtuse, nearly flat at least at base, not or slightly crisped when dry, open-erect straight when moist. Capsule obovate sulcate in its whole length, finally subcylindric; neck short; teeth finally deflexed. Tufts blackish below. — Rocks princ. in northern districts gen. r. *Eur.* Sweden and Norway, less r. in alps! *Amer.* Can.: Macoun; Waghorne.

28.**O.scabridum** Kindb. — Ulota Kindb. cat. Canad. m.; U. americana Mitten ?

Leaves obtusate or broadly acuminate subobtuse, recurved below to middle, distinctly crisped when dry, falcate when moist. Capsule obovate or suboblong sulcate in upper half when young, finally subcylindric; neck somewhat long; teeth erect. Tufts green or brown, dark brown below. — Rocks r. *Amer.* Can. Rocky mts: Macoun.

bb. Leaves long with short papillæ, nearly smooth at least at borders, us. not strongly crisped (at least the elder); alar cells subquadrate. Calyptra densely hairy. Stem us. decumbent. Peristome not appressed; cilia very short, us. wanting.

29 **O.Ludwigii** Bridel. — O. coarctatum Beauvois.

Capsule thick piriform with short stripes near the small mouth; teeth erect. — On trees gen. r. *Eur.* Sweden, Norway! France: Husnot. *Amer.* Can.: Macoun; Waghorne; Drummond 146.

30.**O.Drummondii** Hooker et Greville. — Ulota Bridel.

Capsule narrowly piriform attenuate to mouth, striped to neck; teeth patent when dry. — Trees in northern distr. r. *Eur.* Sweden, Norway! Scotl.: Hunt, com. Husnot. *Amer.* Can.: Waghorne.

cc. Leaves long with short papillæ, not recurved at base, strongly crisped. Peristome with long cilia. Stem erect. Capsule us. finally subcylindric.

31.**O.calvescens** Wilson. — Ulota Wils.; Orthotrichum Kindb.

Leaves us. subulate at apex; upper cells rotundate, the outer basal long-rectangular (often to middle of leaf) in straight rows. Capsule not deeply sulcate, not strangulate; pedicel thin very long; calyptra sparingly hairy. — Trees r. *Eur.* Irel.: Stewart and Holt.

32.**O.Bruchii** Hornschuch. — Ulota Hsch.; Orthotrichum Wilson.

Leaves us. subulate at apex; upper cells rotundate, the outer basal short-rectangular in straight rows. Capsule deeply sulcate; calyptra densely hairy. — On trees or very r. on stones. *Eur.* not uncommon. Sweden, Switzerl.! France: Husnot. *Amer.* r. Can.: Macoun.

33.**O.obtusiusculum** C. M. et Kindb. — Ulota C. M. et K. l. c.

Differs from the last: Leaves more or less obtuse at apex; upper and middle cells oval-oblong. Capsule narrower; pedicel longer and thinner. — Trees r. *Amer.* Can. Brit. Col. and Vanc. isl.: Macoun.

34.**O.ulophyllum** Ehrhart. — Bryum striatum var. ulophyllum Ehrh. 1780; Weisia ulophylla Ehrh. 1787; Orthotrichum Kindb.; O. crispum Hedwig 1788; Ulota Brid. 1819.

Differs from *O. Bruchii*: Outer leaf-cells rhombic-quadrate in oblique rows. Capsule shorter, us. strangulate. — On trees. *Eur.* not uncommon. France! Sweden: Zetterstedt. *Amer.* r. Can.: Macoun; Waghorne.

* **O.crispulum** Bruch. — Ulota Bruch; Orthotrichum Br. eur.

Capsule not strangulate, oval or round-oval not defluent to neck. — *Eur.* not uncommon. Sweden, Norway, France! *Amer.* Can. not r.: Macoun; Waghorne.

* **O.intermedium** Schimper. — Ulota Sch.; Orthotrichum Kindb.

Capsule not or faintly constricted, finally subcylindric, suboval-oblong when young. — Sometimes on rocks, gen. r. *Eur.* Norway! Sweden: P. Olsson. Austria: Breidler. *Amer.* Can.: Macoun; Waghorne. Miquelon isl.: Delamare, com. Cardot.

35.**O.Rehmanni** Juratzka. — Ulota Jur; Orthotrichum Kindb.

Differs from *O. ulophyllum *crispulum*: Leaves less crisped; alar cells quadrate. Calyptra nearly glabrous. — Trees r. Austria: Breidler, com. C. Mueller.

V. Pseud-Ulota Kindb.

36.**O.jutlandicum** Bridel. — Ulota phyllantha Brid. in part.

Leaves sublinear above middle, short-acuminate often subobtuse, nearly flat at borders, faintly papillose; nearly all basal cells long; costa smooth. Capsule oblong; neck long; teeth erect; pedicel long straight thin. — On trees princ. near sea gen. r. *Eur.* Germany: C. Mueller. Norway: J. Roell. France: Husnot. *Amer.* Can. fruiting: Macoun; Waghorne.

37.**O. maritimum** C. M. et Kindb. — Ulota cat. Can. m.; U. phyllantha Bridel in part.

Differs from the last: Leaves gradually attenuate to the subulate apex, more distinctly papillose also on costa. Capsule broad-oval; neck short; pedicel shorter and thicker, curved when moistened. — Rocks near sea less r. *Eur.* Sweden not uncommon! Norway: E. Nyman. *Amer.* Can. fruiting: J. Macoun. Alaska: J. M. Macoun.

VI. Calyptoporus Lindberg.

1. Psilocarpa.

38.**O. psilocarpum** James. — Sullivant icon. musc.

Leaves broadly ovate-lanceolate obtusate subobtuse faintly papillose, recurved below, sometimes faintly crenulate at apex; cells small, the basal short. Capsule broad-oval finally suboblong; neck not distinct; lid mamillate; teeth free opake erect; cilia narrow; calyptra glabrous. Stem about 0,5 c. m. long. — Trees r. *Amer.* U. S.: James, com. C. Mueller. Can.: Macoun.

2. Microcarpa.

39.**O. microcarpum** Notaris; Husnot muscol. gall.

Leaves flat at borders at least at one side, nearly smooth, gen. obtuse suboblong or broadly ovate-lanceolate; basal cells short. Capsule suboval; neck not distinct; teeth papillose yellowish connate in pairs, appressed when dry; calyptra glabrous. — On small trees princ. *Morus* r. *Eur.* Switzerl. near Lugano!

40.**O. Hallii** Sullivant et Lesquereux; Sull. icon. m.

Leaves recurved below middle, distinctly papillose, ovate-lanceolate acute or subsubulate at apex; alar cells quadrate, the inner basal short-rectangular. Capsule oval; neck not distinct; teeth smooth whitish connate in pairs, erect when dry; calyptra hairy. — Trees r. *Amer.* Can.: Macoun.

41.**O. Jamesii** Sullivant icon. muscor.

Leaves faintly reflexed, very papillose with long cylindric papillæ, broadly obtuse ovate-oblong; marginal cells quadrate, the inner basal somewhat long-rectangular not hyaline. Capsule obovate-piriform often with thick neck; teeth smooth pale, wholly or nearly free, deflexed-appressed when dry; calyptra sparingly hairy. — Limestone rocks r. *Amer.* Can.: Macoun.

3. Pulchella.

42.**O. pulchellum** Brunton.

Leaves long narrow subulate at apex, recurved below, flat above, very papillose with long papillæ, us. slightly crisped; nearly all basal cells long. Capsule striped oblong finally cylindric; teeth us. orange. Tufts yellowish green. — On trees in warmer districts or r. on stones. *Eur.* r. Sweden: Wahlstedt. Denmark: M. F. Lange. France: Husnot. *Amer.* Can. not r. in Pacif. distr.: Macoun.

* **O.ulotæforme** Renauld et Cardot.

Leaves distinctly crisped. Peristome pale. — *Amer.* Can.: Macoun. U. S.: Henderson, com. Cardot.

43.**O.Winteri** Schimper; Limpricht.

Leaves short-acuminate acute, recurved nearly all around, faintly papillose with short papillæ, scarcely twisted, gen. shorter than in the last; outer basal cells short. Capsule faintly striate oblong-cylindric; teeth pale. Tufts green, brown below. — Trees and rocks r. *Eur.* Germany: Winter, com. C. Mueller. *Amer.* Can. Pacif. distr.: Macoun.

4. Diaphana.

44.**O.diaphanum** Gmelin. — Bryum Gm.; Orthotrichum Schrader.

Leaves broadly ovate-lanceolate nearly smooth. Capsule oblong smooth when young; neck short; calyptra nearly glabrous. Stem 1 c. m. or shorter. — On trees or r. on stones. *Eur.* not r. Sweden, Germany! *Amer.* r. »U. S.»: Lesq. et Jam.

* **O.canum** Mitten.

»Capsule emergent. Leaves with shorter hairpoint. — *Amer.* r. Can.: Drummond»: Lesq. et Jam.

5. Rivularia.

45.**O.rivulare** Turner.

Leaves decurrent nearly smooth; alar cells rectangular very large. Capsule oval short-necked; teeth opake. Tufts blackish. Stem often long. — Stones and trees in running water r. *Eur.* Engl.: Rogers. France: Le Jolis; Husnot. *Amer.* U. S.: Henderson, com. Cardot.

46.**O.euryphyllum** Venturi.

Differs from the last: Leaves not distinctly decurrent; alar cells short-rectangular or indistinct. Capsule broad-oval; teeth less papillose. Stem about 2—3 c. m. — Stones in running water r. *Amer.* U. S.: Roell.

47.**O.Sprucei** Montagne.

Differs from *O. rivulare*: Leaves more papillose, not distinctly decurrent; cells larger, the alar quadrate. Capsule smaller. Tufts low dark green. — Base of trees near water r. *Eur.* France: Philibert.

6. Cupulata.

A. Capsule not distinctly strangulate; teeth smooth erect when dry.

a. Capsule narrow gen. long-exserted.

48.**O.anomalum** Hedwig.

Leaves subcanaliculate and not subulate at apex, hyaline below, faintly papillose above. Capsule oblong or oblong-cylindric with brown stripes; teeth nearly free. — On stones, less often on trees and roofs. — *Eur.* common. Sweden, Norway, Switzerl.! *Amer.* r. Can.: Macoun.

b. Capsule thick suboval, sometimes immersed.

49.**O.consimile** Mitten; Sulliv. icon. musc.

Leaves not subulate at apex, faintly papillose above, hyaline below. Capsule us. long-exserted; teeth nearly free. Stem us. about 0,5 c. m. — Rocks r. *Amer.* Can. Pacif. distr.: Macoun.

* **O.anomaloides** Kindb. n. subsp.

Capsule less exserted; cilia shorter than teeth. Stem higher. — *Amer.* r. Can.: Macoun.

50.**O.Watsoni** James; Sulliv. icon. musc.

Leaves subulate at apex, strongly papillose with long cylindric papillæ. Capsule wholly immersed; teeth connate in pairs. Stem 1—2 c. m. high. — Alp. rocks r. *Amer.* »U. S.»: Lesq. et Jam.

B. Capsule thick us. strangulate, more or less immersed; teeth nearly free often papillose, often patent when dry. Leaves carinate.

a. Peristomial teeth entire.

51.**O.urnigerum** Myrin. — »O. perforatum Limpricht»: Venturi.

Leaves very papillose, not hyaline below. Capsule us. with indistinct neck; teeth papillose below, gen. erect when dry. Tufts loose dark green. — Rocks princ. siliceous r. *Eur.* Switzerl.! Sweden less r.!; M. Huss. France: Puget.

52.**O.cupulatum** Hoffmann.

Leaves us. faintly papillose, often hyaline below. Capsule with more or less distinct us. thick short neck; teeth gen. smooth, often patent when dry. Tufts us. dense and brown or blackish when dry. — Rocks. *Eur.* not uncommon. Sweden, Switzerl.! *Amer.* Can.: Macoun.

* **O.nudum** Dickson; Venturi.

Capsule subemergent with long not defluent neck. — *Eur.* not uncommon. Switzerl.! Austria: Breidler. Engl.: Rogers. France: Brébisson. *Amer.* Can.: Macoun.

* **O.Sardagnæ** Venturi.

Capsule with long defluent neck. — Dolomitic rocks r. *Eur.* Switzerl.! Austria: Venturi.

* **O.Venturii** Notaris.

Capsule with short subdefluent neck. — Rocks r. *Eur.* »Austria»: Venturi.

b. Peristomial teeth gen. partite and papillose.

53.**O.Lescurii** Austin; Sulliv. ic. m.; Kindb. rev. bryol. 1896.

Leaves nearly smooth short obtusate subobtuse. Capsule immersed with short very thick not defluent neck; teeth erect; calyptra nearly glabrous. Tufts low. — Limestone rocks r. *Amer.* Can. Brit. Col.: Macoun.

* **O.Porteri** Austin.

»Capsule nearly exserted. *Amer.* r. U. S.»: Lesq. et Jam.

54.**O.Baldaccii** Venturi et Bottini.

Leaves very papillose somewhat long and acuminate. Capsule immersed with short defluent neck; teeth patent; calyptra sparingly hairy. Tufts about 2 c. m. high. — Alp. calcareous rocks r. *Eur.* Spain: Dieck, com. Roell. »Montenegro»: Bottini.

7. Pumila.

A. Capsule arrounded below when operculate, finally strangulate when dry. Calyptra campanulate.

55.**O.Schimperi** Hammar. — O. fallax Schimper.

Leaves broadly ovate-lanceolate, gen. broadly obtuse and subcanaliculate; basal cells short-rectangular. Capsule suboval not or slightly emergent; stomata nearly superficial; calyptra glabrous. — On trees and roofs. *Eur.* not uncommon. Sweden! Austria: Venturi. *Amer.* r. Can.: Macoun.

56.**O.strangulatum** Beauvois; Sulliv. icon. musc.

Differs from the last: Leaves often subulate at apex; basal cells sometimes longer. Capsule finally exserted; calyptra sparingly hairy. — On trees or r. on rocks, r. *Amer.* Can.: Macoun.

B. Capsule not arrounded below when operculate.

a. Capsule not distinctly constricted when dry. Leaves subcanaliculate.

57.**O.pallens** Bruch.

Leaves not r. obtuse at apex, faintly papillose, more or less long, often decurrent; inner basal cells somewhat long. Capsule partly emergent somewhat thick with long defluent neck, us. pale yellow; stomata us. not much immersed; teeth us. orange; calyptra campanulate yellowish us. glabrous. Stem us. about 1 c. m. high. — On trees princ. in warmer districts.

Eur. not r. France, Switzerl.! Sweden: Grœnwall. *Amer.* r. »Can.»: Mitten.

* **O.scopulorum** Lindberg. — O. Arnellii and O. rufescens Grœnwall; Limpricht.

Leaves obtuse at apex. Calyptra sometimes papillose. — Rocks r. *Eur.* Finl.: S. O. Lindberg. Sweden: Arnell.

* **O.Rogeri** Bridel.

Leaves gen. obtuse. Capsule red brown; teeth reddish; stomata more immersed. — Trees r. *Eur.* Austria: Arnold in Rabenhorst bryotheca n. 1239. Norway: Kaurin. *Amer.* »U. S.»: Cardot.

58.**O.ohioënse** Sullivant et Lesquereux. — Sulliv. icon. m.

Differs from *O. pallens*: Leaves decurrent, nearly smooth; inner basal cells short-rectangular, the outer subquadrate, the alar larger and rectangular. Capsule thick often immersed; neck short; teeth pale; calyptra sparingly hairy. — On trees. *Amer.* U. S.: Austin, com. C. Mueller. Can.: Macoun.

59.**O.leucomitrium** Bryol. eur.

Leaves broadly acuminate, gen. acute or subsubulate at apex, faintly papillose; inner basal cells somewhat long. Capsule greenish nearly or wholly exserted with long defluent neck, narrower than in *O. pallens*; stomata much immersed; teeth whitish sometimes not connate; calyptra narrowly conic whitish nearly glabrous. Stem 0,5—1 c. m. high. — Trees (princ. *Salix alba*) in southern districts r. Switzerl.!; Philibert. Austria: Venturi. France: Puget.

b. Capsule finally strangulate.

aa. Capsule narrow oblong-cylindric, often exserted; neck long; calyptra narrowly conic.

60.**O.tenellum** Bruch.

Leaves long carinate very papillose; inner basal cells somewhat long. Capsule with defluent neck; teeth pale connate in pairs; calyptra yellow sparingly hairy. Stem 1—2 c. m. high. — On trees princ. in lower districts. *Eur.* not common. Switzerl.! Sweden!; Grœnwall. Italy: Venturi. Germany: Herpell. *Amer.* r. Can.: Macoun.

bb. Capsule thick oval-oblong, us. immersed; neck short; calyptra broad.

61.**O.stramineum** Hornschuch.

Leaves us. long acute often carinate; inner basal cells long-rectangular. Capsule piriform more or less emergent; teeth orange papillose; calyptra straw-colored us. with few short hairs.

Tufts 2—3 c. m. high. — On trees or r. on stones. *Eur.* common below alp. regions. Sweden, France, Switzerl.! Germany: Warnstorf.

62.**O.alpestre** Hornschuch.

Differs from the last: Leaves shorter, less acute and more papillose. Peristomial teeth smooth above. Calyptra us. glabrous. Stem more radiculose. — On rocks in alp. regions, r. on trees. *Eur.* not r. Norway, Switzerl.! France: Husnot. *Amer.* r. »Can. and U. S.»: Lesq. et Jam.

63.**O.pumilum** Swartz.

Leaves broadly ovate-lanceolate carinate us. acute; basal cells short. Capsule suboblong immersed; teeth dark yellow; calyptra glabrous pale yellow. Tufts about 1 c. m. high. — On trees and roofs. *Eur.* not uncommon, Sweden, Switzerl.! France: Husnot. »*Amer.*»: Venturi.

64.**O.Braunii** Bryol. eur.

Differs from the last: Leaves longer. Capsule thicker, oval-piriform; teeth paler. — On trees or r. on stones. *Eur.* r. France: Berthoumieu. Norway: Bryhn.

65.**O.cylindrocarpum** Lesquereux; Sullivant icon. m.

Leaves broadly ovate-lanceolate obtusate subobtuse subcanaliculate; basal cells short. Capsule oval-oblong finally cylindric wholly exserted; calyptra hairy. Tufts 1 c. m. or lower. — Rocks and trees r. *Amer.* Can.: Macoun.

126. **Macromitrium** Bridel.

A. Leaves closely imbricate when dry. Calyptra with long hairs.

1.**M.Sullivantii** C. Mueller. — »M. Dregei» Sulliv. icon. m.

Leaves broadly ovate-lanceolate broadly acuminate subacute carinate, scarcely reflexed, slightly papillose, entire, patent-erect when moist; cells round-oval; costa not percurrent. Perichetial leaves longer and narrower. Capsule oblong-cylindric, contracted at mouth, plicate at it and below when dry; exostome wanting or imperfect; endostomial tube very low; lid rostrate-subulate; pedicel somewhat long; calyptra covering capsule. Branches reddish brown not crowded. Monoecious. — On pine trees r. *Amer.* »U. S.»: Sulliv.

2.**M.Fitzgeraldi** Lesquereux et James.

»Differs from the last in its dark brown color; branches yellowish; capsule larger, distinctly ribbed; lid shorter, conic and blunt; pedicel shorter; leaves longer; male flowers not found. — On trees r. *Amer.* U. S.»: Lesq. et Jam.

B. Leaves crisped when dry. Calyptra slightly hairy.

3.**M.rhabdocarpum** Mitten.

»Leaves linear-lanceolate acute or subobtuse and subapiculate, carinate, not recurved, crenulate, papillose above, spreading-open and slightly flexuous when moist; upper cells round, basal oblong; costa yellowish percurrent. Perichetial leaves narrower, more acute. Capsule oval gradually narrowed to pedicel and to mouth, distinctly plicate; peristome simple: teeth short pale fragile; lid subulate; calyptra covering capsule. Branches not crowded. — *Amer.* U. S., Florida»: Lesq. et Jam.

127. **Schlotheimia** Bridel.

1.**S.mucronifolia** Hooker et Greville. — Macromitrium H. G.; Schlotheimia Kindb.

Leaves sublinear or oblong-lingulate, obtuse often subtruncate, carinate, sometimes recurved, broadly limbate at one side below, entire indistinctly papillose not rugose, patent and faintly curved when moist, slightly crisped when dry; cells very small round-oval, lower marginal narrowly linear; costa dark brown, depressed on upper side, very prominent at back, excurrent to a thick deflexed point. Perichetial leaves similar. Capsule suboblong, contracted at mouth, not sulcate; teeth wanting; lid rostrate; pedicel not long; calyptra glabrous or slightly rough above, laciniate, covering half capsule. Branches red-brown densely crowded. Monoecious. — Trunks of palms r. *Amer.* »U. S.»: Lesq. et Jam. (Cuba: Wright, herb. Sullivant, com. C. Mueller.)

2.**S.Sullivantii** C. Mueller; Sulliv. icon. musc.

Differs from the last: Leaves often rugose, neither recurved nor limbate; basal cells rhomboidal; costa short-excurrent or (in perichetial leaves) subpercurrent. Capsule oblong-cylindric; teeth deflexed when dry; segments ciliiform; calyptra lobulate, rough above, covering whole capsule. — Trees r. *Amer.* U. S.: com. Macoun and Cardot.

128. **Zygodon** Hooker et Taylor.

I. **Eu-Zygodon.** Leaves green papillose carinate not recurved; cell-walls thickened. Perichetial leaves not sheathing. Dioecious.

II. **Gymnocephalus.** Leaves nearly plane or somewhat concave, bluish when moistened; cells smooth with thin hyaline walls. Monoecious.

III. **Amphidium.** Leaves green papillose carinate often recurved at one side; cell-walls not thickened. Perichetial leaves sheathing. Capsule piriform, long-necked; peristome none.

I. Eu-Zygodon.

A. Leaves sublinear apiculate us. not falcate; cells not opake. Tufts small low.

a. Costa of leaves not excurrent. Capsule suboval.

1.**Z.viridissimus** Dickson. — Bryum Dicks.; Zygodon R. Brown.

Leaves gen. complicate above, r. dentate near apex, patent or curved when moist, green when dry. Capsule with short neck; teeth none. Often with propagula. — Trees. *Eur.* not r. France: Le Jolis. *Amer.* r. Can. Vanc. isl.: Macoun; Drummond 27.

***Z.rupestris** Lindb.

Leaves narrower with longer pellucid terminal cell (point), often falcate, us. brown when dry. — Rocks somewhat r. *Eur.* Sweden!

2.**Z.conoideus** Dickson. — Bryum Dicks.; Zygodon Hooker et Taylor; Z. Brebissoni Br. eur.

Leaves entire not complicate above, suberect when moist; cells larger than in the last. Capsule with longer and narrower neck; peristome double. — Trees r. *Eur.* Engl.: Holt. France: Brébisson; Le Jolis; Camus. *Amer.* »U. S.»: Cardot.

b. Leaves with excurrent costa. Capsule round-oval; teeth none.

3.**Z.Stirtoni** Schimper; Braithwaite.

Leaves entire gen. not complicate above, suberect when moist. Often with propagula. — Rocks and stonewalls r. *Eur.* Engl.: Holt. Sweden: Berggren.

B. Leaves ovate-lanceolate dentate above, falcate when moist; upper cells small opake; costa not excurrent. Tufts large; stem long.

4.**Z.gracilis** Wilson; Braithwaite.

Leaves broadly long-acuminate. Capsule cylindric with short neck; peristome double. Tufts dark green. Habit of *Barbula reflexa.* — Calcareous rocks r. *Eur.* Engl.: Rogers; Holt.

5.**Z.Sullivantii** C. Mueller; Sullivant ic. m.

Leaves subulate-acuminate. Capsules unknown. Tufts brown-yellow. — Rocks r *Amer.* »U. S.»: Sullivant.

II. Gymnocephalus Schwægrichen.

6.**Z.Forsteri** Dickson. — Bryum Dicks.; Zygodon Wilson.

Leaves flaccid entire sublingulate acute or short-acuminate; upper cells roundish, the hyaline basal rectangular; costa us. subpercurrent. Capsule piriform or oblong-cylindric with long neck; peristome double. Tufts small. — On bark of trees (*Fagus*) r. *Eur.* Italy: Levier. France: Guépin, com. Husnot.

* **Z.Sendtneri** Juratzka.

Leaves somewhat narrower; costa gen. excurrent. — On bark of *Ostrya* r. *Eur.* »Istria»: Sendtner.

III. Amphidium Limpricht (Amphoridium Schimp.; Lesq. et Jam.)

A. Leaves subulate-acuminate very long, often red-brown. Dioecious.

a. Capsule exserted; lid rostrate. Perichetial leaves with not excurrent costa. Other leaves recurved below at one side, entire or in upper part faintly sinuolate. Stem gen. high.

7.**Z.Mougeotii** Bryol. eur.

Leaves flexuous not distinctly crisped; the perichetial not much broader, short-sheathing gradually long-subulate. — Rocks. *Eur.* not r. Sweden, Norway, Switzerl., Spain! *Amer.* Can.: Waghorne.

8.**Z.crispatus** Kindb. revue bryol. 1896.

Leaves crisped entire with longer acicular point than in the last; the perichetial broader, long-sheathing, abruptly narrowed to the subulate shorter point. — Rocks r. *Amer.* Pacif. distr. Can.: Macoun.

b. Capsule not exserted; lid obtuse or apiculate. Perichetial leaves with long-excurrent costa. Other leaves gen. distantly serrulate above. Stem low when fruiting, often high when sterile.

9.**Z.californicus** Hampe.

Leaves crisped more or less reflexed below at one side, with long acicular point, us. red-brown; the perichetial not broader, short-sheathing gradually long-subulate. — Rocks r. — *Amer.* Pacif. distr.: Macoun.

* **Z.cæspitosus** Mitten. — Didymodon Mitt.; Zygodon Kindb.

Leaves not reflexed less acicular. Capsules unknown. — *Amer.* r. Can. Vanc. isl.: Macoun.

B. Leaves acute fuscescent not long. Monoecious.

10.**Z.lapponicus** Hedwig. — Gymnostomum H.; Zygodon Br. eur.

Leaves crisped entire not or slightly reflexed, sublinear or nearly gradually attenuate; the perichetial very much broader, long-sheathing, abruptly narrowed to a short point; costa faint abbreviate. Capsule scarcely exserted; lid rostellate. Tufts dense gen. low. — Rocks princ. in alps. *Eur.* not uncommon.

Sweden, Norway, Switzerl.! *Amer.* Greenl.: Berggren. Can.: Macoun; Moser.

* **Z.decipiens** Kindb. n. subsp.

Perichetial leaves longer acuminate; costa long-excurrent. — *Amer.* r. Can. Pacif. distr.: Macoun.

129. Anoectangium Schwægrichen.

I. **Pleurozygodon.** Leaves small entire obtusate or short-acuminate.

II. **Molendoa.** Leaves large from short crenulate base tapering to a long subulate channelled acumen.

I. Pleurozygodon Lindberg.

1.**A.compactum** Schwægrichen.

Leaves broadly ovate-lanceolate acute or apiculate, us. spirally twisted about stem when dry; costa yellow subpercurrent. Capsule obovate or oval-oblong; pedicel yellow. Tufts us. brownish with green tops, sometimes bright green. Stem often abruptly foliate. Habit of *Zygodon lapponicus* and *Grimmia* (Streptophyllum). — Rocks princ. in alps. *Eur.* less r. Norway, Switzerl.! Sweden: P. Olsson. *Amer.* r. Alaska: J. M. Macoun. Greenl.: Eberlin, com. Roell.

* **A.brevifolium** (Juratzka as var.) Kindb. n. subsp. — Molendoa tenuinervis Limpricht ?

Stem not abruptly foliate. Leaves crowded much smaller, half as long and broad, ovate-oblong subobtuse nearly all brown, faintly twisted; cells less dusky; costa brown. Tufts more compact, ferruginous when dry. — Alp. rocks r. *Eur.* Norway in Dovrefjeld!

2.**A.Peckii** Sullivant ic. m. — »A. pellucidum Wilson»: Braithwaite.

Differs from *A. compactum:* Leaves sublinear longer and narrower, longer subulate at apex. Plants larger. Capsules unknown. — Rocks r. *Eur.* »Scotl.: Wilson»: Braithwaite. *Amer.* »U. S.»: Sullivant.

3.**A.Schliephackei** Limpricht. — Pleuroweisia Limpr.

Leaves linear obtuse crowded erect when dry; costa yellow not percurrent. Capsule oval. Tufts green above, 1—2 c. m. high. — Calcareous rocks in alp. region r. *Eur.* »Switzerl.: Græf»: Limpricht.

II. Molendoa Lindberg.

4 **A.Hornschuchii** Funck.

Upper leaves green; basal cells narrow; costa sometimes excurrent. Capsule obovate with somewhat long neck; pedicel long (as in other species), often emergent above tufts. Stem often high. — Wet calcareous alp. rocks r. *Eur.* Austria: Breidler.

* **A.Sendtneri** Bryol. eur.

Leaves brown more crisped; costa not excurrent. Pedicel not emergent above tufts. — *Eur.* r. Switzerl.: Schimper.

Fam. 28. Meeseaceæ.

130. Paludella Ehrhart.

1.**P.squarrosa** L. — Bryum L.; Paludella Bridel.

Leaves decurrent crowded; lamina serrulate ovate acute or short-acuminate; costa subpercurrent. Perichetial leaves long-acuminate. Capsule suboblong; lid mamillate; pedicel red very long. Male flowers discoid. Dioecious. Tufts high tomentose. — Very wet swamps. *Eur.* Sweden and Norway common! Spetsbergen: Malmgren. Austria: Venturi. *Amer.* r. Alaska: J. M. Macoun. Can.: J. Macoun.

131. Meesea Hedwig.

A. Leaves from dilated base tapering to a gradually attenuate acumen, decurrent, not reflexed; basal cells larger than the upper. Pedicel very long.

1.**M.triquetra** L. — Bryum L.; Meesea Aongstrœm; M. tristicha Br. eur.

Leaves tristichous denticulate nearly around or entire, spreading from nearly appressed base. Dioecious. Male flowers subdiscoid. — Deep swamps. *Eur.* Norway! Sweden: K. F. Dusén. France: Husnot. *Amer.* Can.: Macoun; Dearness.

2.**M.longiseta** Hedwig.

Leaves plurifarious less spreading, entire or near apex sparingly dentate. Synoecious. — Swamps gen. r. *Eur.* Sweden: Lindberg; R. Hartman; M. Huss. Norway: M. N. Blytt. *Amer.* Can.: Macoun.

B. Leaves sublinear more or less reflexed; nearly all cells equal in size. Pedicel often shortish.

3.**M.trichodes** L. — Bryum L.; Meesea Spruce; M. uliginosa Hedwig.

Leaves plurifarious entire not or scarcely decurrent, us. obtuse, suberect or open-erect when moist. Capsule shorter than in the last; teeth yellow. Inflorescence variable. — Swamps and wet rocks princ. in alps. *Eur.* common in alps. Norway, Switzerl.! *Amer.* Greenl.: Berggren; Vanhoeffen. Can.: Macoun; Waghorne.

4.**M.Albertinii** Bruch et Schimper.

Differs from the last: Leaves more distinctly decurrent us. acute. Peristomial teeth pale very short often confluent. Monoecious. — Swamps r. *Eur.* Sendtner, com. Le Jolis. *Amer.* Can.: Waghorne.

132. **Amblyodon** Palisot de Beauvois.

1.**A.dealbatus** Dickson. — Bryum Dicks.; Amblyodon Beauv.

Leaves narrowly oblong acuminate acute not reflexed; the uppermost serrate at the not long acumen, finally pale green or whitish; the lower finally reddish; costa not percurrent. Capsule thick suboval. Stem about 1 c. m. high. Male flowers discoid. Monoecious or polygamous. Resembling *Meesea trichodes* in capsule. — Wet and turfy soil princ. in alps. *Eur.* Sweden, Norway not r.! France: Husnot. *Amer.* Can.: Macoun.

133. **Plagiobryum** Lindberg.

1.**P.Zierii** Dickson. — Bryum Dicks.; Plagiobryum Lindb.; Zieria julacea Schimper.

Leaves broad-ovate short-acuminate not reflexed; costa not excurrent. Capsule shorter than neck; teeth not much lower than endostome. Tufts silverglossy finally reddish. Dioecious. — Alp. rocks. *Eur.* not r. Norway! Sweden: R. Hartman. *Amer.* r. Can. Rocky mts 2250 metr. a. sea: Macoun.

2.**P.demissum** Hoppe et Hornschuch. — Meesea Hop. et Hsch.; Plagiobryum Lindb.; Zieria Schimper.

Leaves subovate somewhat long-acuminate reflexed; costa excurrent. Capsule longer than neck, deflexed to the ground when unripe; teeth very much lower than endostome. Tufts less glossy. Dioecious. — Earth on rocks in higher alp. region r. *Eur.* Norway! Switzerl.: Schimper. Austria: Breidler. *Amer.* Can. Rocky mts: Drummond 250.

134. **Mielichhoferia** Hornschuch.

A. Leaves small ovate-lanceolate, less strongly appressed; upper cells narrow. Peristomial (exostomial) teeth wanting-

1.**M.nitida** Hornschuch.

Leaves gradually acuminate acute, serrulate above often to middle. Perichetial leaves costate larger. Capsule us. suberect when dry; segments not split; pedicel reddish more or less flexuous; spores about 0,02 m. m. Tufts about 1 c. m. high. Habit of *Bryum* (Webera) but with smaller leaves. — Schistose princ. metalliferous (esp. copper) rocks in alps, r. *Eur.* Norway! France: Husnot.

2.**M.macrocarpa** Hooker. — Weisia Hook.; Mielichhoferia Schimp.

Leaves entire short-acuminate acute or sometimes subobtuse; the perichetial smaller, the inner indistinctly costate. Capsule as in the last. Branches clavate. Tufts about 1 c. m. high. — Rocks r. *Amer.* Can. Rocky mts: Drummond 74, com. Macoun.

B. Leaves short very small strongly imbricate; upper cells dilated. Peristome sometimes double.

a. Uppermost leaves obtusate, acute or obtuse; costa us. not percurrent.

3.**M.compacta** Hoppe et Hornschuch. — Weisia Hop. et Hsch.; Mielichhoferia Kindb.; M. elongata Hornsch.; Limpr.

Leaves gen. ovate-oblong, faintly serrulate near apex. Capsule us. deflexed when dry; teeth rudimentary r. present; segments distantly trabeculate, sometimes split in middle; pedicel yellow arcuate at least when young; spores somewhat larger than in *M. nitida.* Tufts us. low when fruiting, sometimes to 8—10 c. m. high. — Growing as *M. nitida* but more often on wet rocks, r. *Eur.* Norway! Austria: Schimper. France: Husnot.

4.**M.erecta** Lindberg. — Pohlia (Cacodon) Lindb. revue bryol. 1883; Mielichhoferia Kindb.; Oreas Kindb. Laubm. Schwed. u. Norw.; Mielichhoferia defecta Sanio.

Leaves as in the last. Capsule erect when dry; teeth densely trabeculate; segments rudimentary or wanting; pedicel reddish sometimes arcuate when moistened. Tufts very low. — Alp. rocks r. *Eur.* Norway Wangsfjeld in Opdal: Kaurin.

b. Leaves suddenly cuspidate; costa often percurrent.

5.**M.cuspidifera** Kindb. cat. Canad. m.

Leaves from broad-ovate base cuspidate, entire or near apex slightly crenulate. Capsules unknown. Tufts about 2 c. m. high. — Damp alp. rocks r. *Amer.* Can. Rocky mts 1500 metr. a. sea: Macoun.

135. **Orthodontium** Schwægrichen.

1.**O.gracile** Wilson. — Bryum Wils.; Orthodontium Schw.; Stableria Lindb.

Leaves long very narrow sublinear or gradually subulate, flexuous nearly entire not reflexed; lower cells wider than the upper; costa not excurrent. Capsule greenish narrow suboblong cernuous when dry; neck not much narrower or shorter; pedicel pale sometimes longer than stem; teeth pale; lid rostellate. Tufts greenish about 1 c. m. or lower. Monoecious or paroecious. Habit of *Bryum* (Leptobryum). — On sandstone rocks or on old trees r. *Eur.* Engl.: Hunt. France: Camus. *Amer.* »Calif.»: Howe.

Fam. 29. Cinclidiaceæ Kindb., new fam.

136. Cinclidium Swartz.

A. Leaves pale-limbate not recurved. Capsules unknown.

1.**C.Hymenophyllum** Br. eur. — Mnium Br. eur.; Cinclidium Lindb.

Leaves spathulate-lingulate narrowly limbate long-decurrent bright green; upper cells round-hexagonal or round-oval, the basal rectangular; costa abbreviate. Tufts high very dense tomentose to shoots. — Alp. rocks in northern districts, (»also in Switzerl.»: Pfeffer) r. *Eur.* Norway! Sweden: E. Nyman. *Amer.* Greenl.: Berggren.

B. Leaves reddish or finally blackish limbate, more or less recurved when dry.

a. Leaves concave not decurrent; costa not excurrent. Synoecious.

2.**C.stygium** Swartz.

Leaves broadly spathulate us. with short acute point, gen. all red; those of stem r. blackish; shoots r. green; costa gen. percurrent. Capsule suboval. — Swamps princ. in northern alps. *Eur.* Sweden, Norway not r.! Finl.: Brotherus. *Amer.* Can.: Macoun; Waghorne.

C. latifolium Lindb., hitherto not found in our district, differs in convex shoot-leaves and dioecious inflorescence.

3.**C.subrotundum** Lindberg.

Leaves round-spathulate obtuse or with very short obtuse point; those of stem green finally blackish; shoots green; costa not percurrent. Capsule subglobose. — Swamps in northern alps r. *Eur.* Norway! *Amer.* Greenl.: Berggren. Can. Labrador: Macoun.

b. Shoot-leaves convex somewhat long-decurrent; costa excurrent. Synoecious.

4.**C.Macounii** Kindb. revue bryol. 1896.

Stem-leaves round-spathulate finally blackish; shoot-leaves pale red or greenish lingulate gen. obtuse. Capsule suboval. — *Amer.* r. Can. Rocky mts: J. Macoun 1885.

c. Dioecious. Male flowers discoid. Leaves concave.

5.**C.arcticum** Br. eur. — Mnium Br. eur.; Cinclidium C. M.

Stem-leaves red broadly spathulate often with short acute point; shoot-leaves sublingulate gen. obtuse with more or less distinct point, us. pale red, sometimes decurrent; costa gen. percurrent, not excurrent. Capsule suboval; pedicel us. shorter than in other species. — Swamps in northern alps r. *Eur.* Norway in Dovrefjeld!

* **C.virescens** Kindb. n. subsp.

Leaves larger, only those of stem red. Shoots green very long; their leaves gen. not decurrent. Pedicel us. as long as in *C. stygium.* — Swamps in northern alps r. *Eur.* Norway in Dovrefjeld!

* **C.polare** Kindb. n. subsp.

Leaves much smaller, all deep-red; uppermost shoot-leaves acute sometimes short-acuminate. Capsules not seen. — Swamps in arctic district r. *Eur.* Spetsbergen: Berggren, com. A. G. Nathorst.

Fam. 30. Bartramiaceæ.

137. Breutelia Schimper.

1.**B.arcuata** Dickson. — Mnium Dicks.; Breutelia Sch.

Leaves from short base abruptly tapering to a long gradually attenuate striate (princ. when dry) serrate-denticulate acumen, papillose at back, spreading also when dry; costa sometimes excurrent. Capsule subglobose; pedicel us. arcuate, not much longer; segments long. Stem branching erect or decumbent, 8—15 c. m. long with rusty red rhizoids. R. fruiting. — Wet rocks princ. near sea and larger lakes, r. *Eur.* Norway: R. Hartman; E. Nyman. France: Renauld. Engl.: Manchester Cryptog. Society.

138. Bartramia Hedwig.

I. **Eu-Bartramia.** Leaves mamillose, not or only in lower half recurved.

1. **Ithyphyllæ.** Leaves channelled not crisped, not or near base (slightly) reflexed; cells linear.

2. **Crispæ.** Leaves carinate curling or crisped, recurved in lower half; upper cells subquadrate or short-rectangular.

II. **Plagiopus.** Leaves smooth, recurved all around, carinate; upper cells subquadrate.

I. Eu-Bartramia.

1. Ithyphyllæ.

A. Leaves gradually narrowed, reflexed near base and not distinctly sheathing; costa excurrent outside the subula.

1.**B.stricta** Bridel.

Capsule gen. erect; peristome simple; pedicel exserted. Tufts glaucous green above. Synoecious. — Siliceous ground r. *Eur.* princ. in Mediterr. distr. France: Schimper. Italy: Bottini. *Amer.* »U. S.»: Lesq. et Jam.

B. Leaves abruptly narrowed from the not reflexed us. hyaline sheath; costa more or less filling subula.

2.**B.ithyphylla** Bridel.

Capsule inclined; peristome us. double. Costa of leaves not well-defined above but us. not wholly filling subula. Tufts us. glaucous green. Synoecious. — On stone. *Eur.* common. Sweden, Norway, Switzerl.! *Amer.* Greenl.: Vanhoeffen. Alaska: J. M. Macoun. Can.: J. Macoun; Waghorne.

* **B.breviseta** Lindberg.

Capsule deflexed when young, suberect when old; peristome simple rudimentary or wanting; pedicel scarcely exserted. Costa filling subula of leaf. — Northern princ. arctic district r. *Eur.* »Norway: Th. Fries»: Lindberg. *Amer.* Alaska: J. M. Macoun. Can.: Waghorne.

* **B.rigidula** (Schimper as var.) Kindb. n. subsp.

Capsule smaller; pedicel exserted. Leaves rigid brittle appressed when dry. — Alp. and arctic distr. r. *Eur.* Norway! *Amer.* »Greenl.»: Lange.

3.**B.viridissima** Bridel. — »Weisia Brid. 1826»: Limpr. — B. subulata Br. eur. 1846.

Differs from *B. ithyphylla*: Capsule smaller, erect when moist; peristome simple rudimentary us. wanting. Leaves smaller; costa often not defined in subula. Paroecious. — Rocks in higher alp. and arctic distr. r. *Eur.* Switzerl.! Austria: Breidler. *Amer.* Greenl.: Vanhoeffen. »Alaska and U. S.»: Lesq. et Jam.

2. Crispæ.

A. Upper leaf-cells short-rectangular. Leaves crowded very distinctly sheathing, more or less flexuous but not crisped.

4.**B.norvegica** Gunner. — Bryum Gunn. 1772; Bartramia Lindb.; Webera Halleri Hedwig 1782; Bartramia Hedw. 1789.

Leaves not decurrent, abruptly tapering and long-subulate; costa long-excurrent. Pedicel not much longer than capsule. Monoecious or subparoecious. — Rocks often near cascades. *Eur.* not r., nearly common in alps. Sweden, Norway, Switzerl.! *Amer.* r. »Can. Rocky mts: Drummond»: Lesq. et Jam.

B. Upper leaf-cells subquadrate. Leaves crisped or circinnate.

a. Leaves crowded, not distinctly sheathing.

5. **B. pomiformis** L. — Bryum L.; Bartramia Hedwig.

Leaves nearly gradually tapering and long-subulate, not decurrent, crisped; costa not long-excurrent. Pedicel exserted above shoots. Monoecious or subparoecious. — On earth princ. on rocks. *Eur.* common. Sweden, Norway, Switzerl.! *Amer.* Can.: Macoun; Waghorne. U. S.: Sullivant, com. C. M.

b. Leaves sheathing, more or less distant.

6. **B. crispa** Swartz.

Leaves nearly graduallly tapering to a not long subula, not decurrent, circinnate; costa not long-excurrent. Perichetial leaves with very long-excurrent costa. Pedicel us. not exserted above shoots. Tufts sparingly radiculose, green or dark green. Paroecious or synoecious. — Rocks not r. *Eur.* Sweden! *Amer.* Can.: Macoun.

7. **B. glaucoviridis** C. M. et Kindb. l. c.

Leaves sublinear abruptly short-subulate subcircinnate not decurrent; costa subpercurrent or short-excurrent. Pedicel not long. Tufts glaucous green very radiculose. Subparoecious. — Wet rocks in alps r. *Amer.* Can. B. C. near Revelstoke: Macoun.

8. **B. circinnulata** C. M. et Kindb. l. c.

Leaves abruptly tapering and long-subulate circinnate decurrent; costa very long-excurrent. Capsule and flowers unknown. Tufts bright green sparingly radiculose. — *Amer.* r. Can. Brit. Col.: Macoun.

II. Plagiopus Bridel.

9. **B. Oederi** Gunner. — Bryum Gunn.; Bartramia Swartz.

Leaves gradually narrowed short-subulate not sheathing, slightly curling; upper cells subquadrate; costa percurrent. Capsule erect when moist, sometimes small. Tufts compact. Synoecious. — Rocks princ. in alps. *Eur.* common in subalp. region. Sweden, Norway, Switzerl.! *Amer.* Can.: Macoun.

139. **Philonotis** Bridel.

I. **Eu-Philonotis.** Male flowers disciform with more or less patent leaves. Dioecious.

1. **Homomorphæ.** Leaves nearly uniform small narrow, serrate (without double mamillæ at borders), not falcate, often distant. Perigonial leaves acuminate acute. Stem often subcapillary.

2. **Dimorphæ.** Leaves gen. dimorphous and large, r. distant: some short subovate with us. not recurved borders, the others gen. ovate-lanceolate or ovate-oblong, often recurved at base and sometimes falcate; borders serrate or furnished with double mamillæ. Stem gen. long and thick with long branches.

II. **Philonotula.** Male flowers gemmiform with erect leaves. Monoecious or dioecious. Leaves small narrow, nearly erect when moist, not reflexed, faintly mamillose without double mamillæ, often nearly appressed when dry. Fruiting stem very short.

I. Eu-Philonotis.

1. Homomorphæ.

A. Leaves not recurved at borders.

1.**Ph.marchica** Willdenow. — Leskia Willd.; Philonotis Brid.

Leaves ovate-lanceolate acute not sharply serrate, more or less distant; shoot-leaves somewhat shorter; costa short-excurrent. Perigonial leaves erect-patent ovate-lanceolate nearly subulate-acuminate; costa distinct often excurrent. Inner perichetial leaves short, not or scarcely reaching above vaginula. Stem somewhat long. — Wet places in lower districts. *Eur.* not common. Switzerl.! France: Husnot. Germany: Warnstorf. *Amer.* r. Can.: Macoun. U. S.: Roell.

* **Ph.laxa** Limpricht.

»Leaves very distant; costa not excurrent. — *Eur.* r. Switzerl. and Germany»: Limpricht.

2.**Ph.Muehlenbergii** Bridel.

Differs from the last: Leaves smaller, more distant; costa long-excurrent; stem thinner, subcapillary; capsule smaller. — Springs in sandy rocks r. *Amer.* Can.: Macoun. U. S.: Roell; Sullivant, com. C. Mueller.

3.**Ph.Macounii** Lesquereux et James.

Leaves ovate-oblong or broadly ovate-lanceolate, long-subulate, sharply serrate princ. above, crowded, smaller and shorter than in *Ph. marchica;* costa long-excurrent. Perigonial leaves horizontally spreading, ovate-lanceolate acute not subulate; costa not well-defined, obsolete not excurrent. Inner perichetial leaves reaching far above vaginula with long-excurrent costa. Stem somewhat short. — *Amer.* r. Can. Pacif. distr.: J. Macoun.

B. Leaves (at least some ones) recurved, ovate-lanceolate. Capsules not seen. Stem us. subcapillary.

a. Leaves nearly smooth and not sharply serrate; costa short-excurrent.

4.**Ph.Arnellii** Husnot m. G. — »Ph. parvula Lindb.»: Philibert.

Leaves distant long-subulate short-decurrent. Perigonial leaves ovate-lanceolate subulate horizontally patent; costa excurrent. — Wet rocks r. *Eur.* Sweden: Zetterstedt. *Amer.* Greenl.: Wenck, com. Roell.

5.**Ph.subcapillaris** Kindberg n. sp. — Ph. capillaris Lindb. ?
Leaves nearly crowded, shorter acuminate than in the last: perigonial patent erect subovate short acuminate with not excurrent costa, the inner sometimes obtuse. — Wet earth r. *Eur.* Switzerl. near Lugano!

b. Leaves very mamillose and sharply serrate; costa long-excurrent.

6.**Ph.vancouveriensis** Kindb. n. sp.
Leaves long-subulate: perigonial patent-erect broadly ovate-lanceolate acute nearly nerveless. — *Amer.* r. Can. Vanc. isl.: J. Macoun. Alaska: J. M. Macoun.

2. Dimorphæ.

A. Leaves smooth or only at borders furnished with few double mamillæ; cells very pellucid somewhat large.

7.**Ph.glabriuscula** Kindb. cat. Can. m.
Leaves not long gen. decurrent, nearly appressed when dry; those of shoots spreading. Capsules and flowers unknown. — Springs r. *Amer.* Can.: Moser; Waghorne. U. S : Roell.

B. Leaves very mamillose also at the inner cells.

a. Perigonial leaves acute distinctly costate.

8.**Ph.calcarea** Br. eur.
Leaves large gen. serrate without double mamillæ, us. long crowded and falcate: perigonial us. horizontally spreading. Tufts gen. very high. — Calcareous rocks and swamps. *Eur.* not r. Sweden! Switzerl.!; Schimper. Greece: Heldreich. *Amer.* r. »U. S.»: Lesq. et Jam.

* **Ph.mollis** Venturi.
Leaves of sterile stems very distant. Tufts low and loose. — *Eur.* Austria: Venturi. Portugal: com. Venturi. Sweden!

* **Ph.cæspitosa** Wilson.
Leaves more dimorphous, often with some double mamillæ at borders, gen. not crowded: perigonial patent-erect. — Swamps. *Eur.* not common. Belgium: Gravet. Germany: Warnstorf. *Amer.* »Greenl.»: Lange. »U. S.»: Cardot.

9.**Ph.alpicola** Juratzka.
Differs from *Ph. calcarea*: Leaves shorter and broader, more recurved and us. appressed with patent point, either serrate or partly with double mamillæ, r. falcate. Perigonial leaves us. patent-erect. — In alps r. *Eur.* Norway, Switzerl.! *Amer.* Can.: Waghorne. Greenl.: Vanhoeffen.

10.**Ph.acutiflora** Kindb. in Hedwigia 1896 p. 67.
Leaves not serrate and not falcate, recurved to or above

middle, with double mamillæ, gen. appressed when dry, smaller than in *Ph. calcarea*. Perigonial leaves horizontally spreading. Tufts not high; fruiting stem very low. — *Amer.* r. Can.: Macoun. U. S.: Roell.

b. Perigonial leaves gen. all obtuse subovate, the inner not distinctly costate.

11.**Ph.fontana** L. — Mnium L.; Philonotis Bride!.

Leaves plicate below, us. with numerous double mamillæ, mostly crowded: perigonial obtuse patent-erect. Tufts us. glaucous green. — Wet places common and very veriable. *Eur.* Sweden, Norway, Switzerl.! Greece: Heldreich. *Amer.* Can.: Macoun; Waghorne.

* **Ph.seriata** Mitten. — Bartramia Mitt.; Philonotis Lindb.

Shoot-leaves gen. distant, spirally twisted when dry. — Rivulets in alps not common. *Eur.* Norway! France: Gasilien. *Amer.* Can.: J. Macoun. Alaska: J. M. Macoun.

* **Ph.gracilescens** Schimper. — Ph. fontana *angustifolia Kindb. Laubm. Schw. u. Norw.

Leaves (nearly all) small and narrow, often not recurved, those of shoots gen. distant: perigonial subacute at least the outer. Stem somewhat thin. Habit of *Ph. marchica*. — Wet rocks princ. in alps. *Eur.* not common. Sweden, Norway! France: Husnot. Spetsbergen: R. Gyllencreutz.

c. Perigonial leaves not seen. Other leaves not plicate.

12.**Ph.Mohrii** C. M.; Bartramia C. M.; Philonotis Lq. et Jam.

Leaves crowded, resembling those of *Ph. fontana*, but minutely serrulate above, gen. with double mamillæ below, not distinctly plicate, reflexed below, straight, open also when dry; costa long-excurrent. Capsule faintly plicate when dry; lid umbonate. Stem not high; pedicel as long. — Rotten logs r. *Amer.* U. S.: Louisiana: Mohr, com. C. Mueller.

13.**Ph.adpressa** Fergusson; Braithwaite.

Leaves with gen. double mamillæ, broad-ovate uniform, distant decurrent nearly appressed when dry; costa gen. not excurrent. Tufts long loose nearly eradiculose. Capsules unknown. — Wet places r. *Eur.* »Engl.»: Braithwaite. *Amer.* Greenl.: Vanhoeffen.

II. Philonotula C. Mueller.

A. Leaves serrulate all around, narrowly ovate-lanceolate.

a. Leaves subulate at apex; costa excurrent. Monoecious.

14.**Ph.rigida** Bridel.

Leaves faintly papillose or mamillose nearly crowded, us.

appressed when dry. Perichetial leaves long from broad base abruptly subulate. Capsule somewhat large. Fruiting stem very short with few stem-leaves and short verticillate branches. — Wet rocks in warmer districts r. *Eur*. Switzerl.! France: Philibert. Spain: Levier. Italy: Bottini. Engl.: Holt.

15.**Ph.radicalis** Beauvois. — Bartramia Beauv.; Sulliv. icon. musc.; Philonotis Kindb.

Differs from the last: Leaves more gradually acuminate: perichetial longer-subulate; costa short-excurrent; branch-leaves often open-erect when dry. Capsule somewhat smaller; pedicel thinner. — Wet places r. *Amer*. Can. Brit. Col. and Vanc isl.: Macoun. U. S.: Mohr, com. Macoun.

b. Leaves acute not subulate; costa percurrent. Dioecious.

16.**Ph.tenella** C. Mueller.

Leaves crowded appressed when dry, smaller than in the last: perichetial subulate not much broader; perigonial sublinear long-subulate nearly nerveless. — *Amer*. r. »U. S.»: C. M. (Cuba: Wright, herb. Sullivant, com. C. Mueller).

B. Leaves entire and nearly smooth in lower half, sublinear-subulate. Capsules and flowers unknown.

17.**Ph.pumila** Kindb. n. sp.

Leaves erect, smaller and narrower than in *Ph. rigida;* costa scarcely excurrent. Tufts about 1 c. m. high. — *Amer*. r. Can. Ontario near Belleville: Macoun.

140. **Anacolia** Schimper.

1.**A.Menziesii** Turner. — Bartramia Turn.; Sulliv. ic. m.; Anacolia Kindb.

Leaves smooth from subovate base nearly gradually subulate, serrate to the plicate basal part, nearly appressed when dry; lower cells short-rectangular, upper longer; costa short-excurrent or percurrent. Capsule globose pale or reddish brown; teeth short or none; pedicel us. longer than capsule to 1 c. m. Tufts green soft and silky, tomentose. Dioecious. — Rocks r. *Amer*. Can. Pacif. distr.: Macoun. U. S.: E. Hall; Leiberg, com. Mrs Britton.

2.**A.Webbii** Montagne. — Glyphocarpus Mont.; Anacolia Sch.

Differs from the last: Leaves mamillose brittle serrate in upper third; cells gen. quadrate: middle rectangular. Capsule red-brown; pedicel shorter; teeth none. Tufts rigid brown-green. — Earth and rocks r. *Eur*. Mediterr. distr. »Spain and Corsica»: Schimp (Canary islands: Husnot).

141. **Bartramidula** Bruch et Schimper.

1.**B.Wilsoni** Br. et Sch. — Philonotis Braithw.; Bartramia C. M.

Leaves from suboblong entire base tapering to the serrulate acute acumen; upper cells longer-rectangular, the lower shorter; costa not percurrent. Capsule small globose-piriform with short neck; pedicel longer. Tufts scarcely 1 c. m. high. — Rocks r. *Eur.* Engl.: Rogers; George. Scotl.: Fergusson.

142. **Catoscopium** Bridel.

1.**C.nigritum** Hedwig. — Weisia H.; Catoscopium Brid.

Leaves small entire ovate-oblong or broadly ovate-lanceolate acuminate acute; costa percurrent. Capsule red-brown finally blackish glossy, resembling a pinhead in size; pedicel red. Spores about 0,04 m. m. Dioecious. — Swamps and turfy soil in alps or as relics from glacial periode. *Eur.* common in northern alps. Sweden, Norway, Switzerl.! Spetsbergen: Berggren. Engl.: Manchester Crypt. society. *Amer.* r. Can.: Macoun.

143. **Conostomum** Swartz.

1.**C.boreale** Swartz.

Leaves gradually tapering to the subulate apex, faintly serrate in upper part of acumen; costa not or slightly excurrent. Capsule inclined; pedicel much longer. Tufts glaucous green. — Rocks in or near alps. *Eur.* not r. in northern distr. Norway! Sweden!; Wahlenberg. *Amer.* r. Can.: Macoun. Greenl.: Vanhoeffen.

Fam. 31. **Funariaceæ.**

144. **Funaria** Schreber.

I. **Eu-Funaria.** Peristome double. Capsule gen. oblique often annulate.

1. **Annulatæ.** Capsule annulate us. rugose or furrowed when dry; endostome short. Leaves entire. Spores mostly about 0,01 m. m.

2. **Exannulatæ.** Capsule not annulate, slightly or not rugose. Leaves us. serrate. Spores about 0,02 m. m.

II. **Entosthodon.** Peristome simple or none. Capsule not rugose, us. symmetric; annulus none; pedicel short. Leaves serrate, entire or indistinctly sinuolate.

I. Eu-Funaria.

1. Annulatæ.

1.**F.hygrometrica** L. — Mnium L.; Funaria Sibthorp.

Leaves us. ovate-oblong acute subconvolute not distinctly acuminate; costa subpercurrent. Capsule oblique; teeth red with prominent ribs also below; segments well-evolute; lid not umbonate; pedicel us. very long. Spores about 0,01 m. m. — On bare earth common. *Eur.* Sweden etc.! *Amer.* Can.: J. Macoun.

* **F.calvescens** Schwægrichen.

Leaves lanceolate short-acuminate not convolute, crisped. Stem higher. — *Eur.* Switzerl.! Greece: Orphanides. *Amer.* Can. Vanc. isl.: Macoun.

* **F.Ravenelii** Austin.

»Comal leaves narrower, spreading; costa percurrent. — *Amer.* U. S.»: Lq. et Jam.

2.**F.convoluta** Hampe.

Differs from *F. hygrometrica:* Capsule smaller, finally furrowed; teeth yellowish; endostome often rudimentary; lid umbonate. Leaves sometimes short-acuminate. — *Amer.* r. U. S. Pacif. distr. near Washington: Roell.

3.**F.arctica** Kindb. n. sp. — F. hygrometrica var. arctica Berggren.

Resembling a small state of *F. hygrometrica* with smaller leaves and capsules. Differs from it: Spores twice as large, about 0,02 m. m. Leaves ovate mostly obtuse. Peristomial teeth with prominent ribs only near apex; pedicel short. — Earth in arctic distr. r. *Amer.* Greenl.: Berggren.

4.**F.microstoma** Bryol. eur.

Resembling *F. hygrometrica.* Differs from it: Capsule smaller, less rugose often pale; pedicel short; endostome very short or rudimentary; spores 0,02 m. m. Leaves smaller, more or less acuminate. — Wet sand or clay in alps r. *Eur.* Switzerl.! Austria: Breidler. France: Brébisson. *Amer.* »U. S.»: Lq. et Jam.

5.**F.flavicans** Michaux; Lesquer. et Jam.

Leaves ovate-oblong or obovate, abruptly attenuate to a long subulate or acicular point; costa sometimes excurrent. Capsule not or slightly rugose when dry; teeth with prominent ribs only at point; endostome rudimentary; lid umbonate; pedicel not long. Spores about 0,02 m. m. or larger. — *Amer.* r. U. S.: Vasey, com. Macoun.

2. Exannulatæ.

A. Capsule oblique; endostome nearly as high as teeth.

6.**F.serrata** Beauvois; Sulliv. icon. muscor.

Leaves ovate-oblong or ovate-lanceolate, gen. short-acuminate, serrate above; costa subpercurrent. Capsule slightly rugose when dry; teeth without prominent ribs; lid umbonate; pedicel somewhat long. — Moist clay and sand r. *Amer.* U. S.: Langlois, com. Cardot.

7.**F.americana** Lindberg; Sulliv. l. c.

Leaves ovate or ovate-oblong, obtusate or tapering to a long acicular point, entire or faintly serrate; costa sometimes not percurrent. Capsule not rugose; teeth sometimes with prominent ribs in lower part; lid obtusely apiculate; pedicel short. — *Amer.* r. U. S. Montana: Williams, herb. Demetrio, com. Roell.

B. Capsule not rugose, r. straight; endostome short.

8.**F.calcarea** Wahlenberg.

Leaves oval-oblong or subobovate tapering to a gen. long subacicular point: upper us. serrate; costa us. not percurrent. Capsule oblique; pedicel short. — Calcareous soil in warmer districts. *Eur.* not r. Sweden! Austria: Breidler. France: Husnot. *Amer.* r. »Can. and U. S.»: Lesq. et Jam.

* »**F.Muehlenbergii** Schwægrichen»: C. M.

Leaves us. gradually narrowed with subpercurrent or excurrent costa. — *Eur.* Switzerl.! France: Husnot. Germany: W. Baur, com. C. Mueller.

* **F.mediterranea** Lindberg.

Leaves us. entire and abruptly narrowed with abbreviate costa. — *Eur.* Italy: E. Adlerz. *Amer.* »U. S.»: Lesq. et Jam.

* **F.convexa** Spruce.

Leaves larger and faintly serrate. Lid of capsule not umbonate. — *Eur.* southern distr. r. Italy: Bottini. France: Philibert. Greece: Haussknecht; Heldreich.

* **F.pulchella** Philibert.

Leaves smaller; costa short. — *Eur.* r. France: Philibert.

9.**F.californica** Sullivant et Lesquereux; Sull. ic. m.

Leaves oval-oblong or subobovate subobtusate or very shortly acuminate without acicular point, entire or serrate; costa not percurrent. Capsule oblique (or erect symmetric) long-necked; teeth with slightly or not prominent ribs; lid umbonate; pedicel short. — Clay soil r. *Amer.* U. S. Calif.: Bolænder, com. Renauld. — In Sulliv. icon. muscor. capsule is straight, leaves are entire.

* **F.pallescens** Juratzka. — Entosthodon Jur.; Funaria Kindb.

Capsule always straight symmetric; endostome very short; spores a little larger; lid not seen. Leaves entire. — *Eur.* r. Greece: Haussknecht.

II. Entosthodon Schwægrichen.

A. Leaves gen. serrate acute or short-acuminate. Peristome rudimentary or wanting.

a. Capsule subglobose short-necked; pedicel straight longer.

10.**F.obtusa** Dickson. — Bryum Dicks.; Funaria Lindb.; Entosthodon ericetorum Balsamo et Notaris.

Leaves ovate-oblong or broadly ovate-lanceolate, broadly limbate by narrow cells, sometimes nearly entire. Peristome none. Spores smooth. — Clay and sand. *Eur.* not common. Norway: R. Hartman. Sweden: J. Persson. Germany: Herpell.

11.**F.fascicularis** Dickson. — Bryum Dicks.; Funaria Schimp.

Leaves subobovate strongly serrate not limbate. Peristome rudimentary. Spores very rough. — Open fields princ. in warmer districts. *Eur.* not r. Sweden: S. A. Tullberg. France: Husnot. Germany: Warnstorf.

b. Capsule piriform long-necked; pedicel inclined scarcely longer.

12.**F.curviseta** Schwægrichen. — Gymnostomum Schw.; Funaria Milde; Entosthodon Schimper.

Leaves as in the last. Peristome none. Spores verrucose. — Rocks and walls r. *Eur.* France: Husnot. Italy: Giordano; Arcangeli.

B. Leaves entire or indistinctly sinuolate. Peristome simple well-evolute. Pedicel straight somewhat long.

13.**F.attenuata** Dickson. — Bryum Dicks.; Funaria Lindb.; F. Templetoni Smith; Entosthodon Schwægrichen.

Leaves subobovate abruptly short-acuminate limbate by one yellow cell-row. Capsule suboval shorter than neck; teeth articulate; spores smooth. — Humid earth r. *Eur.* princ. near Atlantic and Mediterr. seas. France: Le Jolis; Husnot. Italy: Venturi. Portugal: Levier. Engl.: Percival. *Amer.* »U. S. Calif.»: Lesq. et Jam.

14.**F.Drummondii** Sullivant. — Entosthodon Sull. icon. musc.; Funaria Kindb.

Differs from the last: Leaves gen. not acuminate. Capsule short-piriform longer than neck; teeth indistinctly articulate; spores slightly rough. — Moist clay soil r. *Amer.* U. S.: Langlois, com. Cardot.

145. **Physcomitrium** Bridel.

I. **Eu-Physcomitrium.** Capsule short-necked; peristome none. Leaves long-costate.

1. **Erythrocarpa.** Capsule (as pedicel) red, very dilated at mouth.

2. **Xanthocarpa.** Capsule (as pedicel) yellowish, not or very r. dilated at mouth.

II. **Pseudo-Funaria.** Capsule long-necked; teeth pale indistinctly articulate. Leaves nerveless or short-costate. (Calyptra 4-lobed as in other species.)

I. Eu-Physcomitrium.

1. Erythrocarpa.

A. Capsule somewhat large; lid flat.

1.**Ph.acuminatum** Schleicher. — Gymnostomum Schl.; Physcomitrium Bruch et Sch.

Upper leaves long-lanceolate sharply acuminate, entire at least above, yellow-margined below; costa percurrent or short-excurrent. Lid of capsule mamillate. — Earth princ. on walls r. *Eur.* Switzerl.! Austria: Gander. *Amer.* »U. S.»: Lesq. et Jam.

2.**Ph.Hookeri** Hampe. — Ph. hians Lindb.; Sulliv. ic. m.

Leaves suboblong acuminate entire or serrate; costa not percurrent. Lid of capsule apiculate. — Wet meadows r. *Amer.* Can.: Macoun; Dearness. U. S.: Henderson, com. Cardot.

B. Capsule small. Leaves suboblong.

3.**Ph.sphæricum** Ludwig. — Gymnostomum Ludw.; Physcomitrium Bridel.

Leaves obtuse or obtusate gen. entire; costa not percurrent. Lid of capsule flat apiculate. — Earth near water in lower distr. r. *Eur.* Engl.: Rogers. Finl.: Brotherus.

4.**Ph.eurystomum** Esenbeck. — Gymnostomum Es.; Physcomitrium Sendtner.

Leaves short-acuminate serrate above; costa percurrent or excurrent. Lid of capsule convex mamillate. — Earth r. *Eur.* Italy: Venturi. Germany: Ruthe. Austria: Breidler.

2. Xanthocarpa.

A. Pedicel of capsule not emergent above upper leaves; lid convex.

a. Capsule immersed.

5.**Ph.immersum** Sullivant icon. muscor.

Leaves narrowly oblong-lingulate or lanceolate short-acuminate, sharply serrate above; costa not percurrent. Capsule globose with dilated mouth; lid mamillate. - River banks r. *Amer.* Can.: Macoun.

6.**Ph.coloradense** Britton bull. Torr. club 1894.

Leaves subovate obtusate or short-pointed, slightly serrate above; costa percurrent. Capsule subglobose-piriform; lid apiculate. — *Amer.* »U. S. r.»: Mrs Britton.

b. Capsule emergent shorter than pedicel.

7.**Ph.pygmæum** James.

Leaves suboblong acute or short-acuminate, slightly serrate above; costa not percurrent. Capsule oblong-piriform; lid apiculate. — Earth in alps r. *Amer.* »U. S. Utah»: Lq. et Jam.

B. Pedicel of capsule long-exserted.

a. Lid of capsule flat when ripe and moist.

8.**Ph.piriforme** L. — Bryum L.; Physcomitrium Bridel; Ph. Drummondii Britton.

Upper leaves oblong-lanceolate not sharply acuminate, serrate above; costa not percurrent. Capsule not or slightly strangulate when dry; lid apiculate. — Wet earth and walls. *Eur.* common in lower districts. Sweden! Engl.: Rogers. France: Husnot. *Amer.* Can.: Macoun.

9.**Ph.turbinatum** Richard. — Ph. Kellermani Britton l. c.

Upper leaves long-lanceolate sharply acuminate serrate above; costa percurrent or short-excurrent. Capsule often strangulate when dry; lid us. mamillate, sometimes short-pointed. — *Amer.* r. Can.: Dearness. U. S.: com. Macoun; Boll and Brendel, com. C. Mueller.

b. Lid of capsule convex us. mamillate.

10.**Ph.megalocarpum** Kindb. bull. Torr. club XVI.

Upper leaves long-lanceolate sharply acuminate nearly entire yellow-margined; costa percurrent or short-excurrent. Capsule us. large r. slightly strangulate. — *Amer.* Pacif. distr. Can.: Macoun. U. S.: Henderson, com. Cardot.

* **Ph.californicum** Britton l. c.

»Leaves shorter, oblong-lanceolate sometimes not sharply acuminate; costa not percurrent. Capsule smaller, slightly strangulate. — *Amer.* U. S.»: Mrs Britton.

11.**Ph.Langloisii** Renauld et Cardot. — Ph. australe Britton l. c.

Differs from *Ph. megalocarpum:* Leaves serrate all around, not or less distinctly yellow-margined; capsule not large, sometimes strangulate when dry; lid sometimes apiculate. — *Amer.* r. U. S.: Langlois, com. Cardot; C. Roell, com. J. Roell.

12.**Ph.platyphyllum** Kindb. cat. Canad. m.

Leaves broad ovate-oblong: upper sharply acuminate serrate above; costa percurrent or short-excurrent. Capsule not large, not distinctly strangulate when unripe. — *Amer.* r. Can.: Fletcher, com. Macoun.

II. Pseudo-Funaria Kindb.

13.**Ph.Bolænderi** Lesquereux. — Entosthodon Lesq.; Sull. ic. m.; Physcomitrium Kindb.

Leaves from subobovate base abruptly narrowed to a short subulate acumen, nearly entire. Capsule piriform; pedicel not long; lid convex mamillate; calyptra with very long beak. — Clay soil r. *Amer.* »U. S. Calif.: Bolænder»: Sullivant.

146. **Pyramidula** Bridel.

1.**P.tetragona** Bridel.

Upper leaves ovate short-acuminate acute entire; cells larger than in *Pottia truncatula*; costa us. excurrent. Capsule subglobose with short thick neck; lid short obtuse; calyptra vertically splitting. Spores 0,04—0,07 m. m. Monoecious. — Meadows princ. cloverfields in early spring. *Eur.* less r. Sweden: Hartman. Germany: Huebner. *Amer.* r. »U. S.»: Lesq. et Jam.

147. **Discelium** Bridel.

1.**D.nudum** Dickson. -- Bryum Dicks.; Discelium Brid.

Leaves ovate-oblong or broadly ovate-lanceolate nearly hyaline. Capsule cernuous very small; pedicel thin reddish. Protonema evolute in the autumn. Dioecious. — Wet sand viz. by rivers r. *Eur.* Sweden! Norway: E. Nyman. Germany: Schemmann. *Amer.* »U. S.»: Lesq. et Jam.

Fam. 32. **Bryaceæ.**

148. **Leucolepis** Lindberg.

1.**L.acanthoneura** Schwægrichen. — Hypnum Schw.; Leucolepis Lindb.; Bryum Menziesii Hooker; Mnium C. M.

Leaves distant long-decurrent simply serrate not limbate. Lower leaves squamiform hyaline, orange at base, gen. long and ovate-lanceolate long-acuminate cuspidate. Upper stem-leaves ovate short-acuminate or filiform-pointed. Branch-leaves ovate-oblong or broadly ovate-lanceolate acute carinate; costa dentate at back, not excurrent. Outer perichetial leaves long-acuminate; costa long-excurrent. Capsule large *Mnium*-like brown-red inclined or cernuous; pedicels long, often in pairs; lid not seen. Tufts loose tomentose at base. Dioecious. — Earth and logs in woods. *Amer.* Pacif. distr. r. Can.: Macoun. U. S.: Howell, com. Cardot.

149. **Rhizogonium** Bridel.

1.**R.spiniforme** L. — Hypnum L.; Rhizogonium Bruch.

Lowest leaves short; the others distant long sublinear short-subulate thickened at the doubly dentate margins, flexuous when dry, nearly straight when moist; costa short-excurrent. Outer perichetial leaves short simply dentate; costa long-excurrent. Capsule subobovate faintly curved; lid with short red beak; teeth brown, pale at apex; endostome yellow; cilia short-appendiculate; pedicel subbasilar pale red very long. Tufts tomentose below, often high. Synoecious. Habit of *Hypnaceæ* in capsule and its lateral pedicel. — Swamps in subtropical districts. *Amer.* U. S.: Fitzgerald, com. Renauld (Cuba: Wright, com. C. Mueller).

150. **Timmia** Hedwig.

A. Sheath of leaves with finally red-brown cells; costa us. dentate at back. Dioecious.

1.**T.austriaca** Hedwig.

Leaves from broad sheath abruptly narrowed to the sublanceolate in upper half serrate gen. obtuse and faintly involute lamina, not or loosely appressed when dry. Capsule sulcate when dry; cilia not appendiculate; lid apiculate. — Shaded often dry rocks. *Eur.* not r. Sweden, Norway, Switzerl.! *Amer.* r. Can.: Macoun.

2.**T.arctica** Kindb. in botan. notiser 1893.

Leaves above sheath tapering to the broad-lanceolate obtuse entire or to $^1/_5$ faintly denticulate not much narrower and scarcely involute lamina, impressed at both sides above sheath, appressed when dry and not much open when moist, much smaller than in the last; costa nearly smooth. Stems not or loosely tufted, about 3—4 c. m. high. Capsules unknown. — Swamps in arctic districts r. *Eur.* Spetsbergen: R. Gyllencreutz 1883. *Amer.* »Greenl.»: Berggren.

B. Sheath of leaves with pale either hyaline or (in elder leaves) pale brown cells; costa not dentate.

a. Lower leaves short gen. obtusate. Dioecious very r. fruiting. Tufts pale green. »Cilia not appendiculate»: Juratzka.

3.**T.norvegica** Zetterstedt.

Upper leaves channelled longer acuminate, entire or indistinctly denticulate in lower half; elder sheath-cells partly pale brown. — Wet alp. rocks r. *Eur.* Norway, Switzerl.! Spetsbergen: R. Gyllencreutz. *Amer.* Can. Rocky mts: Macoun.

b. Cilia appendiculate. Leaves acuminate not short. Monoecious. Tufts brown below, green above.

4.**T.megapolitana** Hedwig.

Leaves channelled serrate in whole lamina; nearly all broadly short-acuminate, only the uppermost long-acuminate; elder sheath-cells pale yellowish brown. — Wet meadows and swamps or r. on rocks. *Eur.* r. »Germany»: Limpricht. *Amer.* less r. Can.: Macoun. U. S.: Roell.

5.**T.bavarica** Hessler.

Differs from the last: Nearly all leaves subconvolute serrate in upper half; sheath-cells hyaline. — Crevices and caverns of rocks. *Eur.* not r. Norway! *Amer.* r. Can.: Macoun.

151. **Aulacomnium** Schwægrichen.

I. **Orthopyxis.** Capsule red-brown often straight; pedicel not very long. Male flowers gemmiform. Leaf-cells rotundate green nearly uniform. Tufts green not high. Not growing in swamps.

II. **Gymnocybe.** Capsule brown not straight; pedicel very long. Male flowers discoid. Upper leaf-cells round-angular, lowest basal larger us. brown. Tufts us. high large and yellowish. Dioecious. Growing in swamps.

I. Orthopyxis Palisot de Beauvois.

1.**A.androgynum** L. — Mnium L.; Aulacomnium Schwægrichen.

Leaves broader below, gradually tapering and sublinear subobtuse, denticulate above, recurved below to middle. Capsule straight subcylindric; teeth pale yellow; lid conic; pedicel longish. Often with globose pedicellate buds. Dioecious. — Rocks and stumps princ. in lower districts. *Eur.* common. Sweden, Germany! *Amer.* Can.: Macoun.

2.**A.heterostichum** Beauvois. — Orthopyxis Beauv.; Aulacomnium Br. eur.

Lower leaves obovate; upper suboblong subobtuse or apiculate, slightly reflexed near base, serrate nearly all around. Capsule oblong-cylindric often curved; teeth whitish; lid rostellate; pedicel not long. Monoecious. — On base of trees. *Amer.* eastern states. Can.: Macoun. U. S.: Green, com. Cardot.

II. Gymnocybe Ahnfelt et Fries.

3.**A.palustre** L. — Mnium L.; Aulacomnium Schwægr.

Leaves not cucullate, serrulate above, gen. sublanceolate, very papillose, us. twisted when dry. Inner perichetial leaves subulate; costa excurrent. Capsule often curved; lid rostellate. Tufts us. tomentose, often with pseudopodia (pedicellate buds). — Swamps common. *Eur.* Sweden, Switzerl.! *Amer.* Can.: Macoun; Waghorne.

* **A.papillosum** C. M. in Flora 1875.

Leaves with longer papillæ, long-decurrent; alar cells larger, subrectangular. Capsules unknown. — *Amer.* U. S. Colorado: com. C. Mueller.

* **A.fasciculare** Bridel. — Mnium Brid.; Aulacomnium Kindb.

Leaves smaller and shorter, entire obtuse somewhat distant. — In alps r. *Eur.* »Austria»: Limpricht. *Amer.* Greenl.: Vanhoeffen.

* **A.imbricatum** Br. eur.

Leaves shorter, entire obtuse imbricate. Tufts nearly eradiculose. Habit of *A. turgidum.* — Princ. in alps, r. *Eur.* France: Payot, com. Husnot. *Amer.* Can.: Macoun.

* **A.polycephalum** Bridel. — Mnium Brid.; Aulacomnium Br. eur.

Leaves more acute and nearly subulate gen. small. Capsules unknown. — *Eur.* r. Belgium: Verheggen, com. Husnot.

4.**A.turgidum** Wahlenberg. — Mnium Wng; Aulacomnium Schwægr.

Leaves cucullate above, suboblong entire obtuse imbricate nearly smooth; costa somewhat short. Inner perichetial leaves subacute; costa not percurrent. Capsule nearly straight; lid not rostellate. Tufts nearly eradiculose without pseudopodia. R. fruiting. — Humid places princ. in northern alps. *Eur.* Norway not uncommon! Sweden: E. Nyman. Spetsbergen common: R. Gyllencreutz. *Amer.* Greenl.: Vanhoeffen. Alaska: J. M. Macoun. Can.: Macoun; Waghorne.

152. **Mnium** Linné, in part.

I. **Pseudo-Bryum.** Leaf-cells elongate suboblong. Leaves large nearly entire not distinctly limbate. Dioecious.

II. **Eu-Mnium.** Leaf-cells gen. round-hexagonal except the marginal and sometimes the inner near costa.

A. Leaves entire limbate; outer perichetial broad not long.

1. **Hymenophylloidea.** Leaves small, those of decumbent shoots distichous. Capsules unknown.

2. **Punctatiformia.** Leaves large not distichous; uppermost rosulate. Lid of capsule rostrate or rostellate.

B. Leaves entire or dentate us. not limbate: outer perichetial long narrow sublinear. Lid of capsule convex mamillate. Dioecious.

3. **Stellariformia.** Leaves bluish when moist; cells not large.

C. Leaves simply dentate, limbate by pale cells; costa excurrent. Outer perichetial leaves us. broad and not long. Stem often with decumbent stolons at base.

a. Leaves not linear.

4. **Cuspidatiformia.** Leaves gradually larger upwards not rosulate and not undulate, us. abruptly acuminate; teeth ciliiform; cells round-hexagonal us. not large. Lid of capsule submamillate. Us. synoecious.

5. **Rosulata.** Leaves us. obtuse or with short point and gen. not undulate; teeth r. ciliiform; cells large sometimes suboval. Upper leaves of fruiting stem rosulate. Lid of capsule mamillate-apiculate. Mostly dioecious.

6. **Rostrata.** Leaves obtuse often undulate; teeth not ciliiform; cells small round-hexagonal. Upper leaves of fruiting stem rosulate. Lid of capsule long-rostrate. Dioecious.

b. Leaves linear-lingulate.

7. **Undulata.** Leaves strongly undulate, the uppermost of fruiting stem rosulate; cells small round-hexagonal. Lid of capsule submamillate. Stems not tufted; shoots deflexed or the basal ascending. Dioecious.

D. Leaves doubly dentate (r. nearly entire), limbate by finally red cells. Outer perichetial leaves oblong-lanceolate. Stem r. with decumbent stolons. Leaf-cells gen. not large.

8. **Spinosa.** Upper leaves broad; costa excurrent. Capsules us. clustered; lid rostrate or rostellate.

9. **Serrata.** Upper leaves narrow; costa us. percurrent. Capsule us. solitary; lid rostrate or apiculate.

10. **Horna.** Leaves long narrow; costa not percurrent. Capsule solitary; lid mamillate. Tufts very tomentose.

I. Pseudo-Bryum Kindb.

1.**M.cinclidioides** M. N. Blytt.

Leaves gen. suboval obtuse; costa not excurrent. Capsule suboval; teeth brown. Tufts loose high. — Swamps princ. in northern distr. *Eur.* Norway! Sweden: M. Huss; Miss O. Cron. Belgium: Gravet. *Amer.* r. Can.: Macoun.

II. Eu-Mnium.

1. Hymenophylloidea.

2.**M.hymenophylloides** Huebener.

Leaves circular or round-oval gen. obtuse, pale-limbate glaucous or bright green; costa not percurrent. Stem not tomentose. — Alp. rocks r. *Eur.* Norway, Switzerl.! *Amer.* Can. Rocky mts: Macoun.

2. Punctatiformia.

A. Leaves narrowly limbate by 1—2 pale cell-rows, short-decurrent. Capsule broad-oval less large. Synoecious or dioecious.

3. **M. subglobosum** Br. eur

Leaves green spathulate at least the upper; inner cells gen. large. Inner perichetial leaves ovate subobtuse; cells oblong-oval. Stem often tomentose. — Swamps princ. in northern alps. *Eur.* not common. Norway, Switzerl.! Sweden: R. Hartman. Spetsbergen: R. Gyllencreutz. *Amer.* r. Greenl.: Vanhoeffen. Can.: J. Macoun. Alaska: J. M. Macoun.

B. Leaves broadly limbate by 3—4 often red cell-rows, not decurrent. Capsule us. large suboval. Dioecious.

4. **M. punctatum** Schreber. — Bryum Schreb.; Mnium Hedwig.

Leaves broad-oval or round-oval finally blackish or reddish; innermost cells larger than the outer. Inner perichetial leaves ovate-lanceolate acuminate; cells sublinear. Stem us. tomentose. — Wet places. *Eur.* common. Sweden, Norway, Switzerl.! *Amer.* not r. Can.: J. Macoun. U. S.: Wetherby. Alaska: J. M. Macoun.

5. **M. glabrescens** Kindb. note on Canad. bryol. 1893.

Leaves oval-lingulate green or pale red, not nigrescent; the uppermost suboblong or oblong-lanceolate; cells smaller than in the last. Perichetial leaves as in *M. subglobosum.* Stem nearly glabrous. Pedicel often longer than in *M. punctatum.* — Earth and old logs. *Amer.* Pacif. distr. not uncommon. Alaska: J. M. Macoun. Can.: J. Macoun; Dawson. U. S. Calif.: Marshall A. Howe.

* **M. chlorophyllosum** Kindb. n. subsp.

Capsule (unripe) narrowly oblong. Leaf-cells very chlorophyllose. Stem tomentose. — Wet rocks r. *Amer.* Can. Ontario: Macoun.

3. Stellariformia.

6. **M. stellare** Reichard; Hedwig.

Leaves not or indistinctly limbate oblong-oval us. entire or the uppermost (of fruiting stem) denticulate above; shoot-leaves often distichous. — On rocks and base of trees. *Eur.* not uncommon. Sweden, Norway, Switzerl.! Austria: C. E. Kindberg. *Amer.* Can.: Macoun; Moser.

7. **M. Blyttii** Bryol. eur.

Leaves (at least on fruiting stem) red-limbate often doubly dentate, us. larger than in the last, not distichous. R. fruiting. — Rocks in northern alps r. *Eur.* Norway! *Amer.* Can.: Macoun.

4. Cuspidatiformia.

A. Leaves crowded dentate all around, spreading when moist. Capsule yellowish finally red-yellow with red mouth; neck dark red tapering to pedicel. Sterile shoots erect often clavate.

8.**M.venustum** Mitten; Sulliv. ic. m. — M. Neevii C. M.

Leaves oval or subobovate; cells small. Capsules clustered often 4—6; endostomial membrane not perforated. — Trees and rocks r. *Amer.* Pacif. distr. Can.: Macoun. U. S.: Howell, com. Cardot.

B. Leaves not crowded, entire below, patent when moist. Capsule greenish finally brownish; neck not distinct.

9.**M.cuspidatum** Schreber. — Bryum Schreb.; Mnium Leysser.

Leaves suboblong long-decurrent; cells small. Capsule solitary; endostomial membrane perforated; lid apiculate. Tufts loose us. with numerous decumbent stolons. — Woods and rocks. *Eur.* common in lower distr. Sweden, Germany, Italy! *Amer.* Can.: Macoun.

10.**M.Drummondii** Bruch et Schimper; Sulliv. icon. m. — M. submarginatum Nawaschin et Zinger.

Leaves oval or subobovate, somewhat larger than in the last with longer teeth and larger cells. Leaves of fruiting stem short-decurrent. Capsules us. clustered 2—3; endostomial membrane not perforated; lid mamillate or obtuse. Tufts dense, r. with decumbent or decurved stolons. Sometimes with distinct male flowers. — Old logs in woods. *Eur.* r. Russia: Zinger, com. Zickendrath. »Germany»: Milde. *Amer.* less r. Can.: Macoun. U. S.: A. G. Wetherby.

5. Rosulata.

A. Leaf-cells gen. hexagonal-oval and seriate, at least the inner near costa. Dioecious.

11.**M.affine** Blandow.

Leaves oblong-oval or narrower, dentate all around (r. entire), us. short-decurrent; teeth us. long; nearly all inner cells suboval. Capsules often clustered 2—3. Tufts loose. — Wet grassy places. *Eur.* not r. Sweden, Norway, Switzerl.! *Amer.* Can.: Macoun.

* **M.ciliare** Greville. — Bryum Grev.; Mnium Lindberg.

»Leaves with long ciliiform teeth»: C. M. syn. — *Eur.* »Sweden»: Lindberg. *Amer.* »U. S.»: Greville.

* **M.Seligeri** Juratzka et Milde.

Leaves gen. narrow and long-decurrent with short teeth. Capsule us. solitary. Shoots erect. — Rocks. *Eur.* not r. Sweden! Belgium: Gravet. *Amer.* »U. S.»: Lesq. et Jam.

12. **M.rugicum** Laurer.

Leaves oblong-oval or narrower, gen. entire and short-decurrent; the uppermost faintly dentate and not much larger than the lower, less distinctly rosulate; cells gen. round-hexagonal, the innermost near costa oval. Shoot-leaves nearly entire. Tufts loose. — Swamps r. *Eur.* Sweden, Norway! Germany: Warnstorf. *Amer.* Can. near Ottawa and N. Labrador: Macoun.

B. Leaf-cells round-hexagonal not seriate. Often synoecious. Leaves dentate all around, the uppermost rosulate.

a. Leaves very narrow, oblong-lanceolate acuminate; the outer perichetial longer acuminate. Plants robust.

13. **M.insigne** Mitten; Sullivant icon. muscor.

Leaves long-decurrent. Capsules us. clustered 3—5; lid us. mamillate. Stem us. with decumbent stolons. Tufts loose. Dioecious. — Wet ground r. *Amer.* Can. Pacif. distr. in Brit. Col.: Macoun.

14. **M.robustum** Kindb. n. sp. — M. medium * robustum Kindb. bull. Torr. club XVII.

Leaves not or very short-decurrent. Synoecious. Otherwise as the last. — Earth in bogs and woods r. *Amer.* Can. Vanc. isl.: Macoun.

b. Leaves short broad or only the uppermost narrow.

15. **M.medium** Bryol. eur.

Leaves not or slightly decurrent with not ciliiform teeth: lower oval-oblong obtuse, upper subobovate-lingulate, outer perichetial short-acuminate. Capsules us. in pairs or solitary; lid apiculate. Tufts loose. Shoots us. erect. Plants robust. Synoecious. — Wet rocks and woods. *Eur.* not common. Sweden, Switzerl.! Austria: Breidler. *Amer.* r. Can. Prince Edw. isl.: Macoun.

* **M.boreale** Kindb. n. subsp.

Pedicel and stem very much shorter; leaves and capsules smaller. Leaves not decurrent. Capsule gen. solitary and straight; lid convex sometimes mamillate. Tufts dense. — Alp. rocks r. *Eur.* Norway in Dovrefjeld!

* **M.curvatulum** Lindberg. — Astrophyllum Lindb.; Mnium Limpr.

»Capsules clustered oblong-cylindric curved very wide-mouthed, smaller and shorter than in *M. medium*; lid depressed semiglobose conic not mamillate. Stems not tufted. Synoecious. — Alp. rocks r. *Eur.* Sweden in Lapland: Hj. Holmgren»: Lindb. musci scand.

16.**M.arcticum** Kindb. in Biblioth. botan. 42 (1897).

Lower leaves decurrent with long ciliiform teeth, oblong obtuse; the uppermost oblong-lanceolate short-acuminate acute; outer perichetial ovate-lanceolate long-acuminate acute. Capsule solitary small (as in *M. cuspidatum*) suboval; pedicel not long. Tufts loose, about 2 c. m. high. Shoots erect. Dioecious. Habit of *M. cuspidatum*. — Arctic district r. *Amer.* Greenl. Karajak-Nunatak: Vanhoeffen.

6. Rostrata.

17.**M.rostratum** Schrader.

Leaves not or slightly decurrent: lower small rotundate or broad-oval; upper oval or broadly obovate obtuse, entire below. Capsules yellowish often clustered. Tufts loose. — Rocks and stonewalls. *Eur.* not r. in lower distr. Sweden, Switzerl.! *Amer.* Can. not uncommon: Macoun.

7. Undulata.

18.**M.undulatum** Weis.

Leaves decurrent obtuse dentate all around. Capsules often clustered. — Wet woods in lower distr. *Eur.* nearly common. Sweden!; J. Persson. Denmark: M. F. Lange. Greece: Heldreich.

8. Spinosa.

19.**M.spinosum** Voit. — Bryum Voit; Mnium Schwægrichen.

Leaves curled when dry: upper subobovate; inner perichetial us. doubly dentate limbate. Tufts dark green loosely cohering. Dioecious. — Earth and rocks in woods, sometimes in alps. *Eur.* not uncommon. Norway, Switzerl.! *Amer.* r. »U. S.»: Lesq. et Jam.

20.**M.spinulosum** Bryol. eur.

Leaves not or slightly curled: upper subobovate; inner perichetial us. simply dentate and not limbate. Tufts bright green densely cohering. Synoecious. — Base of trees. *Eur.* r. Austria: Schimper. France: Husnot. Germany: Progel. *Amer.* not r. Can.: Macoun; Dawson.

* **M.macrociliare** C. M. et Kindb. l. c.

Leaves dark-green smaller; teeth more ciliiform, sometimes simple. Capsule solitary. — *Amer.* r. Can.: Macoun.

9. Serrata.

A. Synoecious or paroecious without special male plants. Stem us. radiculose between lower leaves.

21.**M.marginatum** Dickson. — Bryum Dicks. 1790; Mnium Beauvois; M. serratum Schrader ? (1791); Br. eur.

Leaves long-decurrent; costa scarcely percurrent. Upper stem-leaves suboblong subobtuse short-acuminate, dentate above middle; lower leaves oval obtuse entire; shoot-leaves also entire. Capsule oval-oblong not strangulate, with not or slightly dilated mouth; lid rostellate or apiculate; teeth brownish. Tufts green or finally brownish green us. dense, often high. — On earth. *Eur.* common. Sweden, Switzerl.! *Amer.* Can.: Macoun.

22.**M.Niagaræ** Kindb. cat. Canad. m.

Leaves gen. indistinctly decurrent. Upper stem-leaves lanceolate acuminate dentate to below middle, crowded and not decurrent; costa excurrent. Lower leaves oblong acute more or less dentate. Upper shoot-leaves also dentate. Capsule cylindric-fusiform strangulate wide-mouthed; lid obliquely rostrate; teeth yellow. Tufts loose dark green. — On earth under trees near water r. *Amer.* Can. Niagara: Macoun.

B. Dioecious (with separate male plants). Stem gen. not radiculose between leaves. Upper leaves us. dentate all around.

a. Leaves crisped (princ. on long us. decumbent stolons), gradually larger upwards on fertile stem; costa not excurrent.

23.**M.riparium** Mitten. — M. ambiguum H. Mueller.

Leaves oval-oblong subobtuse, dentate all around, often crowded and not decurrent on fertile stem; shoot-leaves small distant us. long-decurrent; cells larger than in *M. orthorhynchum.* Capsule straight oblong-oval; teeth pale; lid rostellate. Stem not high. — Wet rocks r. *Eur.* Norway, Switzerl.! Sweden: E. Nyman. *Amer.* Can.: Macoun.

24.**M.umbratile** Mitten; Sullivant icon. m.

Leaves narrowly lanceolate acuminate very distant and long-decurrent. Capsule curved suboblong large often with long neck; teeth yellow; lid apiculate; pedicel often very long. — Wet rocks r. *Amer.* Can. Brit. Col.: Macoun.

b. Leaves faintly curled. Stem without decumbent stolons.

aa. Leaves distant long-decurrent. Tufts loose us. high.

25.**M.lycopodioides** Hooker. — Bryum Hook.; Mnium Schwægr.

Leaves lanceolate-acuminate gradually larger upwards; costa gen. excurrent. Capsule curved suboblong, larger than in *M. orthorhynchum*; teeth dark yellow or pale brown; lid rostellate. — Wet alp. rocks r. *Eur.* Switzerl. near Spluegen! (*Asia*, Sikkim: Wichura, com. Mus. Berolin.).

26.**M.decurrens** C. M. et Kindb. l. c.

Lower leaves small oval-oblong; upper suddenly larger, lanceolate acute less distant; costa not excurrent. Capsule straight suboval; teeth dark yellow; lid apiculate. Stem often very high. — Wet alp. rocks r. *Amer*. Can.: Brit. Col.: Macoun. U. S.: Roell.

bb. Upper leaves nearly crowded and not or shortly decurrent. Leaves gradually larger upwards. Tufts often low.

27.**M.orthorhynchum** Bridel.

Lower leaves suboval, upper suboblong gen. acute; costa not excurrent, us. dentate at back. Capsule straight suboval; teeth pale; lid rostellate. Tufts us. dense. Rocks princ. in alps. — *Eur*. not r. Norway, Switzerl.! France: Husnot. *Amer*. Can.: Macoun.

28.**M.inclinatum** Lindberg.

Differs from the last princ. in shorter and smaller leaves; the lower rotundate or broad-ovate, the upper suboval subobtuse. Capsule curved suboblong; teeth yellow; lid apiculate. Tufts often loose. R. fruiting. — Alp. rocks r. *Eur*. Norway, Switzerl.! *Amer*. Can.: Drummond; Macoun. Greenl.: Vanhoeffen.

29.**M.pseudo-lycopodioides** C. M. et Kindb. l. c. — M. lycopodioides Lesq. et Jam.

Leaves as in *M. orthorhynchum* but gen. obtuse and more curled; costa not dentate, often excurrent. Capsule curved with distinct neck; teeth pale; lid rostellate. Tufts loose not high. — Base of trees in swamps r. *Amer*. Can.: Macoun.

10. Horna.

30.**M.hornum** L.

Leaves sublinear-lanceolate or oblong-lanceolate, not or scarcely decurrent. Capsule oblong or suboval; teeth pale. Tufts often high. Dioecious. — Rocks and woods. *Eur*. gen. common. Sweden, Norway! *Amer*. Can.: Macoun.

153. **Roellia** Kindb. revue bryol. 1896.

1.**R.lucida** Britton. — Bryum Britt.; Roellia Kindb.; Mnium Brotherus in Hedwigia 1893; M. Roellii Broth. in Bot. Centralblatt 1890.

Lower leaves distant ovate acute long-decurrent entire not limbate; upper crowded not decurrent, subspathulate with short often twisted acumen, serrate in upper third, faintly reflexed below, limbate by 2 narrow cellrows; upper cells oval-oblong, lower oblong or narrower; costa abbreviate or short-excurrent. Comal leaves oblong-lingulate. Perichetial leaves erect, shorter and much narrower, long-acuminate: inner nearly entire, neither limbate nor reflexed. Capsule long subcylindric pale rufous not constricted; teeth yellow; lid high-conic short-apiculate pale; pedicel very long, irregularly curved or geniculate. Tufts green.

— Near cascades in alp. regions r. *Amer.* U. S. Oregon 2100 metr. a. s.: J. Roell, com. Brotherus; Idaho 1350 metr. a. s.: Leiberg, com. Mrs E. G. Britton.

2.**R.simplex** Kindb. — Bryum Kindb. cat. Canad. m.; Mnium (Roellia) Kindb. revue bryol. 1896.

Nearly allied to the last but well-distinct. Differs from it: Leaves smaller, crowded and not decurrent. Comal leaves shorter, oval-spathulate. Shoot-leaves nearly similar, more numerous and not distant, not or indistinctly limbate. Capsule constricted below the wide mouth; lid obtuse. Endostome hyaline, cilia not appendiculate, spores small, as in the last. — Alp. regions r. *Amer.* Can. Brit. Col., Gold Range 2100 metr. a. s., Vanc. isl. (mt Benson): Macoun.

154. **Rhodobryum** (Schimper, as subgenus) Limpricht.

1.**R.roseum** Weis. — Mnium Weis; Rhodobryum Limpricht; Bryum proliferum (L. as var.) Sibthorp; Lindb.; Braithwaite.

Comal leaves suboblong or broadly lingulate, obtusate acute or abruptly broad-apiculate, serrate above middle, revolute below it; costa gradually narrower, not excurrent. Capsule red-brown subsymmetric nearly straight; neck short not or slightly curved; lid conic or subconvex mamillate; archegonia 5—6; pedicels often clustered. — Wet places in woods in lower districts. *Eur.* nearly common. Sweden, Switzerl.!

2.**R.ontariense** Kindb. — Bryum Kindb. bull. Torr. club XVI.

Comal leaves lingulate abruptly short-acuminate, much more numerous than in the last, dentate with large confluent often yellowish teeth above to $^{1}/_{4}$ or $^{1}/_{3}$, revolute below the dentate part; costa stout excurrent. Capsule pale brown asymmetric; neck curved half as long; lid convex short-apiculate; archegonia numerous; pedicel us. solitary. Dioecious as the last. — Old logs and limestone rocks. *Amer.* not r. Can.: Macoun; Moser. U. S.: Wetherby; Roell; Marshall A. Howe.

155. **Bryum** L.; Hedwig.

A. Perichetial leaves few, not much differing from the other upper ones. — Leaves gen. entire or faintly denticulate with few teeth, often limbate; upper cells us. rhomboidal; costa often excurrent.

a. Cilia of endostome mostly appendiculate. Spores small, about 0,01 m. m., r. nearly 0,02 m. m. Capsule r. oblique.

aa. Capsule thin-walled. Upper leaves setaceous; costa broad.

I. **Leptobryum.** Capsule with long downwards narrowed neck, very nitid (vernicose). Leaves not limbate; cells sublinear. Stems not julaceous.

bb. Capsule thick-walled. Leaves not setaceous; costa narrow.

II. **Eu-Bryum.** Capsule with distinct, already before sporosis downwards narrowed neck. Leaves often limbate; costa often excurrent. Stems r. julaceous.

III. **Pachylophus.** Capsule with very short and thick, before sporosis not narrowed and often indistinct neck. Leaves not limbate, gen. reddish at insertion; costa not often excurrent. Stems mostly julaceous. Us. dioecious.

b. Cilia gen. smooth, r. appendiculate. Spores gen. large, about 0,03—0,04 m. m., r. smaller (about 0,02 m. m.) Capsule not r. oblique.

IV. **Cladodium.** Capsule gen. with distinct narrowed neck. Leaves mostly limbate; costa us. excurrent.

B. Perichetial leaves well-defined gen. numerous. — Leaves gen. denticulate with numerous teeth, r. (in *Epipterygium*) limbate; costa gen. not excurrent. Capsule narrowly necked, not oblique; cilia very r. (in *Webera*) appendiculate; spores gen. small.

a. Endostomial segments broad; cilia us. long.

V. **Webera.** Leaves not limbate, us. denticulate; cells us. narrow; costa sometimes short-excurrent.

VI. **Epipterygium.** Leaves broadly reddish limbate, entire, the larger us. distichous; cells dilated; costa abbreviate.

b. Endostomial segments somewhat narrow; cilia short or rudimentary.

VII. **Pohlia***). Perichetial leaves sublinear-lanceolate narrowly acuminate acute. Leaves not limbate; upper cells gen. very narrow.

Eu-Bryum.

A. Basal leaf-cells not (or very pale) red. Capsule brown. Leaves gen. entire. Dioecious.

1. **Julacea.** Leaves crowded small green us. shining, gen. neither limbate nor reflexed; cells mostly very narrow; costa not or scarcely excurrent. Capsule not oblique. Stems julaceous. R. fruiting.

2. **Speirophylla.** Leaves more or less distant, often red, not shining, sometimes reflexed or limbate; cells dilated; costa sometimes excurrent. Capsule straight or (sometimes in *B. pallens*) oblique. Stems not julaceous.

B. Basal leaf-cells (at insertion of elder leaves) us. deep-red.

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*) This section could be related as a proper genus to fam. *Mceseaceæ*, allied to *Plagiobryum* and *Orthodontium*.

a. Capsule gen. red, r. brown. Leaves broader at base, without hairpoint, r. limbate.

3. **Erythrocarpa.** Leaves often serrulate above; costa thin excurrent. Capsule mostly red. Tufts small us. loose. Dioecious or r. monoecious.

4. **Alpiniformia.** Leaves gen. entire; costa somewhat thick, gen. not (r. shortly) excurrent. Tufts large and dense. Us. dioecious.

b. Capsule brown or red-brown. Leaves gen. with a by costa not formed hairpoint, often entire; the lower of stem or the upper of shoots often broader above middle.

5. **Trichophora.** Leaves us. limbate; costa often abbreviate. Capsule gen. subclavate. Dioecious or r. synoecious. Tufts often large and dense.

c. Capsule brown. Leaves broader at base, without hairpoint, entire or denticulate; costa us. excurrent. Dioecious or sometimes synoecious.

6. **Bimiformia.** Leaves gen. broadly limbate and large, sometimes denticulate, often distant. Stem distinct us. high.

7. **Cæspiticia.** Leaves not or very narrowly limbate, gen. entire and not large, crowded. Stem distinct gen. not high.

8. **Gemmiformia.** Leaves not or narrowly limbate, small entire crowded. Stem very short with gemmiform shoots. Cilia of endostome sometimes not appendiculate.

Pachylophus.

A. Plants small with small leaves. Tufts low.

1. **Argenteiformia.** Capsule often red; neck finally narrowed. Costa of leaves subpercurrent or short-excurrent. Stems julaceous.

2. **Versicoloriformia.** Capsule us. (finally) red; neck us. not narrowed. Costa of leaves long-excurrent. Stems r. julaceous.

B. Plants large with large leaves.

3. **Zonatiformia.** Capsule yellowish; neck finally narrowed. Costa of leaves gen. subpercurrent. Stems not julaceous, us. very tomentose.

Cladodium.

A. Leaves not (or very faintly) red at insertion. Tufts mostly loose.

a. Capsule and peristomial teeth red. Leaves not limbate.

1. **Erythrodontia.** Capsule short-necked, not oblique. Monoecious.

b. Capsule and peristomial teeth brownish or yellowish. Leaves gen. limbate.

2. **Arcticiformia.** Capsule gen. not longer than neck, often oblique; teeth short; endostome more or less adhering. Us. synoecious. Leaves gen. entire.

3. **Cernuiformia.** Capsule not longer than neck, us. oblique; teeth long; endostome gen. not adhering. Us. monoecious. Leaves us. denticulate above.

4. **Purpurascentiformia.** Capsule gen. longer than neck, not oblique. Often monoecious.

B. Leaves dark red at insertion (at least in elder leaves). Peristomial teeth brownish or yellowish.

a. Capsule red. Tufts loose.

5. **Calophylloidea.** Capsule very short-necked. Monoecious.

b. Capsule brownish or yellowish. Tufts gen. dense.

6. **Penduliformia.** Capsule gen. longer than neck, not oblique. Us. synoecious, r. dioecious or monoecious. Leaves gen. not decurrent.

7. **Rutilantiformia.** Capsule gen. not longer than neck, oblique. Us. dioecious, r. monoecious. Leaves decurrent distant.

Webera.

A. Perichetial leaves sublinear-lanceolate narrowly acuminate acute, longish. Other leaves r. decurrent.

1. **Crudiformia.** Capsule indistinctly necked before sporosis, finally not much longer than neck, often yellowish brown, gen. not pendent; pedicel long. Leaves often somewhat large; upper cells very narrow.

2. **Nutantiformia.** Capsule distinctly necked also before sporosis, not much longer than neck, brownish (or partly reddish) and somewhat narrow, pendent; cilia sometimes appendiculate. Leaves often distant; upper cells sometimes dilated.

3. **Pulchelliformia.** Capsule more or less distinctly necked before sporosis, gen. much longer than neck, often pendent and appressed to pedicel, sometimes reddish. Leaves small us. distant. Stem short. Dioecious.

B. Perichetial leaves shortish, oblong-lanceolate acute broadly acuminate or obtuse. Other leaves gen. decurrent; cells not r. dilated.

4. **Cucullatiformia.** Male flowers gemmiform. Capsule brownish annulate. Leaves green us. short.

5. **Albicantiformia.** Male flowers discoid. Capsule reddish not annulate. Leaves us. long, often glaucous green.

I. Leptobryum Br. eur.

1.**B.piriforme** L. — Mnium L.; Bryum Wiggers.

Capsule piriform or round-oval, chestnut-colored; neck long; lid small; annulus revoluble; teeth pale yellow; pedicel long. Tufts us. 1—2 c. m. high. Resembles somewhat *Dicranella heteromalla* in habit. — Stone-walls and rocks nearly common. *Eur.* Sweden etc.! *Amer.* Can.: Macoun. U. S.: com. Cardot.

II. Eu-Bryum.

1. Julacea (Anomobryum Schimper).

A. Leaves obtusate obtuse, us. shining when dry.

2.**B.filiforme** Dickson. — Anomobryum julaceum Schimp.

Leaves ovate or ovate-oblong, very concave, gen. entire; upper cells narrow; costa not percurrent. Capsule suboblong. Stems longish, tufted. — Sandy soil in alps r. *Eur.* Switzerl.! Austria: Schimper.

B. Leaves short-acuminate or apiculate (or some ones obtuse).

a. Leaves of the short fruiting stem reflexed, sublimbate, not shining; costa percurrent.

3.**B.bullatum** C. Mueller.

Leaves broad-ovate or ovate, entire; cells narrow. Capsule small oblong-piriform yellowish pendent; cilia appendiculate. Tufts loose; shoots and male plants longish. Habit of the last. — *Amer.* r. Can., Selkirk mts: Macoun 1890. »Alaska»: C. M.

b. Leaves neither reflexed nor limbate, us. shining; costa subpercurrent or (in *B. juliforme*) abbreviate.

4.**B.juliforme** C. Solms Laubach. — Anomobryum Solms; Bryum Schimper.

Leaves ovate-oblong, denticulate near apex; upper cells narrow; costa short. Capsule claviform. Tufts about 1 c. m. high. — Rocks r. *Eur.* Italy: Bottini; Arcangeli. Norway: Hagen.

5.**B.sericeum** Lacroix. — B. leptostomum Schimp.

Leaves suboval entire: those of shoots often obtuse; upper cells oblong-lanceolate. Capsule suboblong; »peristome rudimentary»: Limpricht. Stem us. very low when barren, sometimes 1 c. m. high in fruiting state. — Wet rocks r. *Eur.* France: Berthoumieu; Lamy, com. Husnot.

6.**B.concinnatum** Spruce.

Leaves ovate or broadly ovate-lanceolate, gen. entire; upper cells often rhomboidal. Capsules unknown. Stems longish, often mixed in other moss-tufts, sometimes with greenish bulbilli. Often silver-glossy when dry. — Rocks princ. in alps r. *Eur.* Norway, Switzerl.! »*Amer.*»: Lq. et Jam.

7.**B.Geheebii** C. Mueller.

»Leaves broad-ovate obtusely short-acuminate; upper cells rhombic. Capsules unknown. Stem with bulbilli. Tufts 3 c. m. high. Habit of the last. — Wet rocks r. *Eur.* Switzerland»: Limpricht.

* **B.Combæ** Notaris.

»Leaves ovate-oblong obtusely short-acuminate; upper cells oblong-oval or rhomboidal. Capsules unknown. Tufts 1 c. m. high. — *Eur.* r. Sardinia island: Comba»: Limpricht.

2. Speirophylla.

A. Leaves finally rose-red, loosely disposed, gen. not limbate. Capsule not oblique, longer than neck.

a. Leaves long-decurrent; costa not excurrent.

8.**B.Duvalii** Voit. — B. lato-decurrens C. M. et Kindb. l. c.

Leaves not reflexed, ovate-oblong acute or apiculate. Capsule brown strangulate; pedicel often very long. Stems often long and loosely tufted. Not often fruiting. — Swamps also in alps. *Eur.* not uncommon. Norway! *Amer.* Can.: Macoun; Moser.

9.**B.obtusifolium** Lindberg.

Leaves reflexed, gen. broad-ovate obtuse, r. subacute. Ripe capsules not found; pedicel not long. Tufts us. dense and not high. — Northern alps near perennial snow r. *Eur.* Norway! Sweden: E. Nyman. Spetsbergen: Berggren; Gyllencreutz. *Amer.* Alaska: Palmer (fertile).

10.**B.pygmæo-alpinum** C. M. et Kindb. l. c.

Leaves not reflexed, gen. broad-ovate obtuse, less loosely disposed. Capsules unknown. — Wet rocks in alp. region r. *Amer.* Can., Vanc. isl. 1700 metr. a. s.: Macoun.

b. Leaves gen. not decurrent; costa sometimes excurrent.

11.**B.erythrophyllum** Kindb. cat. Can. m.

Leaves (at least the lower) reflexed, subovate scarcely apiculate; cells subrhombic; costa percurrent. Capsule brown suboblong finally strangulate. Tufts loose. — Wet earth r. *Amer.* Can.: Macoun. Alaska: Palmer.

12.**B.erythrophylloides** Kindb. cat. Can. m.

Leaves diversiform, not reflexed: uppermost oblong-lanceolate somewhat long-acuminate with narrower cells and short-excurrent costa; middle leaves ovate-oblong acute with subrhombic cells and percurrent costa; the lowest ovate-oval subobtuse. Capsules unknown. Tufts loose. — By springs r. *Amer.* Can.: Macoun.

* **B.Gaspeanum** Kindb. l. c.

Nearly all leaves narrow: uppermost short-decurrent, lower sublimbate; costa sometimes long-excurrent. Capsules unknown. — Wet rocks r. *Amer.* Can.: Macoun.

13.**B.alpiniforme** Kindb. cat. Can. m.

Leaves not reflexed, ovate-oblong short-acuminate or apiculate; cells subrhombic; costa gen. short-excurrent. Capsules unknown. Tufts somewhat dense. — Rocks r. *Amer.* Can.: Macoun.

B. Leaves us. red, gen. not much distant, limbate; costa percurrent or short-excurrent; shoot-leaves us. decurrent. Capsule shorter than neck, not or indistinctly constricted below mouth, often oblique.

14.**B.pallens** Swartz.

Leaves us. reflexed to above middle, ovate-oblong or subobovate, acute or acuminate, entire or nearly so, brownish or yellow limbate, somewhat twisted when dry. Capsule us. oblique with often curved neck; teeth yellow; endostome nearly orange; lid mamillate; cilia sometimes not appendiculate; spores r. large. Stem us. low (about 1 c. m.) and sparingly radiculose near base. Tufts loose. Easily confounded with *B. arcticum.* — Moist earth, sometimes on stone-walls, often in alps. *Eur.* common. Sweden, Norway, Switzerl.! *Amer.* r. Can.: Macoun.

* **B.rufescens** Kindb. n. subsp.

Leaves very distant, entire, faintly or not reflexed, spreading when dry. Tufts dense rufescent 6—8 c. m. high. Capsules unknown. — Alp. districts r. *Eur.* Norway, near Kongswold!

* **B.fallax** Milde.

Leaves scarcely reflexed, oval-ovate narrowly limbate us. not red; costa gen. percurrent. Capsule us. not oblique; lid apiculate; cilia not appendiculate. Tufts low less loose. — Wet rocks princ. in higher alp. region r. *Eur.* Norway! France: Boulay. *Amer.* Alaska: J. M. Macoun.

* **B.baldense** Venturi.

»Capsule symmetric; cilia not appendiculate. Costa of leaves gen. abbreviate. — Calcareous alp. rocks r. *Eur.* Austria»: Vent.

C. Leaves us. greenish, more or less loosely disposed. Capsule strangulate, not oblique.

a. Leaves obtuse: costa abbreviate.

15.**B.cyclophyllum** Schwægrichen. — Mnium Schw.; Bryum B. E.

Leaves not distinctly limbate, round-oval or broadly obovate, loosely disposed, not distinctly decurrent, not or scarcely reflexed. Capsule brown-yellow; neck short. Stems not or loosely tufted, often long. Very r. fruiting. — Wet places princ. below alps r. *Eur.* Sweden: R. Hartman. Finl.: Brotherus. France: Boulay. *Amer.* Can.: Macoun. Greenl.: Berggren.

b. Leaves gen. acute (in *B. Schleicheri *latifolium* mostly obtuse); costa percurrent or short-excurrent. R. fruiting. Male flowers subdisciform.

16.**B.turbinatum** Hedwig.

Leaves indistinctly or very narrowly limbate, not imbricate when dry, carinate; upper cells rhomboidal. Stem-leaves ovate-lanceolate, reflexed below, gen. not decurrent. Capsule long-necked; teeth yellow, segments paler; lid apiculate. Tufts us. tomentose, often high. — Wet places also in alps. *Eur.* not common. Sweden, Norway, Switzerl.! France: Schimper. England: Rogers. *Amer.* r. Can.: Macoun.

17.**B.Schleicheri** Schwægrichen.

Differs from the last: Leaves shorter, ovate-oblong concave, gen. broadly limbate and decurrent; upper cells often subrhombic. Capsule larger, short-necked; segments nearly orange; lid conic. Tufts sparingly radiculose. — Wet places in alp. region princ. in southern districts. *Eur.* Switzerl., Norway! Austria: Breidler. *Amer.* r. Can.: Macoun.

* **B.latifolium** Schleicher. — Mnium Schl.; Bryum Bridel.

Leaves larger, subovate gen. obtuse, often partly reddish. — In higher alp. region r. *Eur.* Switzerl.! Austria: Venturi. Greece: Heldreich. France: Husnot. Scotl.: Holt.

18.**B.grandirete** Kindb. n. sp.

Leaves acute not limbate, imbricate when dry, ovate or broad-ovate, not or scarcely acuminate, loosely disposed and short-decurrent; cells very large: upper subrhombic; costa percurrent. Capsules unknown. Tufts sparingly radiculose, red-brown below, yellowish green above, not high. — In alps r. *Amer.* Can. Brit. Col.: Macoun.

3. Erythrocarpa.

A. Leaves not limbate.

a. Capsule strangulate turbinate. Dioecious.

19.**B.Klinggræffii** Schimper. — »B. constrictum Bruch mscr.» Husnot.

Leaves small entire, reflexed below: uppermost ovate-lanceolate; costa percurrent or short-excurrent. Tufts loose green. — Earth and stone-walls r. *Eur.* Switzerl.! Germany: Milde. Sweden: Groenwall.

b. Capsule not strangulate.

aa. Capsule thick short-piriform. Monoecious.

20.**B.Sauteri** Bryol. eur.

Leaves entire narrowly ovate-oblong not reflexed; costa long-excurrent. Tufts reddish green or brownish. — Wet sand by alp. rivulets r. *Eur.* Austria: Gander.

bb. Capsule gen. narrow. Dioecious

21.**B.erythrocarpum** Schwægrichen.

Leaves narrow serrulate above, reflexed below middle, often decurrent; the uppermost with excurrent costa. Tufts yellowish green. Often with red bud-like propagula. — Sandy places princ. below alps. *Eur.* not uncommon. Sweden, Switzerl.! *Amer.* »U. S.»: Lesq. et Jam.

22.**B.murale** Wilson.

Leaves ovate-oblong not reflexed gen. entire, not decurrent; costa excurrent. Tufts yellowish green, or reddish below. — Stone-walls and rocks in lower distr. r. *Eur.* Switzerl.! Greece: Heldreich. France: Le Jolis.

B. Leaves limbate. Capsule not strangulate. Dioecious.

a. Leaves serrulate above. Capsule narrow.

23.**B.marginatum** Bryol. eur.; Husnot m. gall.

Leaves ovate-oblong not reflexed; costa subpercurrent. Tufts dense brown-red. — Sandstone rocks r. *Eur.* »Germany: Bruch»: Schimper.

24.**B.Bomanssonii** Lindberg.

Leaves ovate-lanceolate reflexed below; costa long-excurrent. Tufts brown loose. — *Eur.* r. Finl.: Bomansson, com. Brotherus.

b. Leaves nearly entire, not distinctly reflexed. Capsule sometimes thick.

25.**B.rubens** Mitten; Braithwaite brit. mossfl.

Leaves ovate-oval; costa excurrent. Capsule narrow; lid apiculate. Tufts somewhat loose yellowish green, or reddish below. — On ground r. *Eur.* »Engl.»: Braithwaite.

26.**B.micro-erythrocarpum** C. M. et Kindb. l. c.

Leaves ovate-oblong; costa gen. subpercurrent. Capsule thick piriform; lid rostellate. Tufts dense finally rufescent. — Wet gravel near water. *Amer.* Can. Vanc. isl.: Macoun.

4. Alpiniformia.

A. Leaves distinctly limbate (at least the lower) and reflexed; costa gen. percurrent.

a. Leaves obtusate subobtuse; the lower broadly recurved and limbate; the uppermost not limbate and nearly flat. Capsules unknown.

27.**B.percurrentinerve** Kindb. bull. Torr. club XVII.

Leaves somewhat large, not distinctly decurrent, nearly appressed when dry; upper cells oblong-oval. Lower leaves subovate finally red; uppermost green glomerate oval or oval-oblong. Tufts about 2 c. m. high. — Dripping rocks near a waterfall r. *Amer*. Can. Brit. Col.: Macoun.

b. Leaves (at least the upper) acute, all narrowly reflexed and limbate.

aa. Leaf-cells red also those of the limb.

28.**B.hæmatophyllum** Kindb. cat. Canad. m.

Leaves very small, scarcely twisted; upper cells subrhombic. Lower leaves oval-ovate subobtuse; uppermost suboblong acute with short-excurrent costa. Capsule (unripe) small oblong-obovate; lid convex short-apiculate; pedicel thin short. Tufts about 1 c. m. high. — Wet rocks r. *Amer*. Can. Rocky mts and Anticosti: Macoun.

29.**B.anoëctangiaceum** C. M. et Kindb. l. c.

Differs from the last: Nearly all leaves acute more distinctly acuminate, less distinctly reflexed and limbate, less crowded and spirally twisted when dry. Capsules unknown. Tufts scarcely 2 c. m. high. — Rocks by torrents r. *Amer*. Can. Brit. Col.: Macoun.

bb. Leaf-cells not red.

30.**B.hæmatocarpum** C. M. et Kindb. l. c.

Leaves ovate oblong acuminate, slightly corrugate and not or loosely appressed when dry: those of branches distant decurrent. Capsule blood-red not constricted; endostome orange; segments short; cilia often indistinctly appendiculate; pedicel 2—5 c. m. long. Tufts tomentose about 5 c. m. high. — Damp rocks r. *Amer*. Can. Brit. Col.: Macoun.

B. Leaves not or indistinctly limbate.

a. Leaves gen. broadly recurved all around or to above middle, not decurrent; costa us. red.

aa. Costa of leaves gen. excurrent.

31.**B.aciculinum** Kindb. n. sp.

Leaves oblong-lanceolate acute recurved nearly all around, nearly appressed when dry; upper cells oblong-rhomboidal, lower basal near costa deep-red numerous. Capsule brown; teeth pale. — In alp. region r. *Amer*. Can. Brit. Col. 1250 metr. a. sea: Macoun.

bb. Costa of leaves gen. percurrent.

32.**B.alpinum** Hudson.

Leaves nearly appressed not twisted when dry, us. ovate-oblong or ovate-lanceolate acute and recurved to above middle; upper cells us. narrow. Capsule blood-red not or faintly constricted. Tufts often copper glossy. — Wet rocks. *Eur.* not uncommon. Sweden, Norway, Switzerl.! *Amer.* r. »U. S. White mts»: James.

* **B.meridionale** Schimper.

Leaves narrower with narrow cells; the uppermost often with short-excurrent costa. — *Eur.* southern distr. r. Spain, Portugal: **Levier.**

* **B.appressum** Kindb. in Hedwigia 1896 p. 66.

Capsule brown. Leaves narrow, lanceolate short-acuminate acute or obtuse, recurved all around, more strongly appressed when dry, gen. not red at base; costa not red. Tufts sparingly radiculose not glossy. - *Amer.* r. U. S. Washington: Roell.

* **B.gemmiparum** Notaris.

Leaves us. green and not glossy, sublimbate by one row of narrower cells, less recurved and less appressed, gen. subobtuse: uppermost often denticulate near apex; costa not red. Capsule red-brown. Very r. fruiting. — Wet rocks r. *Eur.* Switzerl.! Italy: Bottini. Belgium: Delogne.

33.**B.Muehlenbeckii** Br. eur. — B. alpinum var. brevifolium Myrin; B. brevifolium Lindb.; B rubicundulum C. M. et Kindb. l. c.

Differs from *B. alpinum*: Leaves gen. suboblong obtusate or obtuse, often recurved nearly all around; upper cells more dilated. Capsule sometimes brown (but often blood-red). Tufts not glossy. — Dripping rocks. *Eur.* less r. Norway! Sweden: Arnell; P. Olsson. Switzerl.: Culmann. *Amer.* r. Can.: Macoun; Waghorne.

34.**B.Raui** Austin.

Leaves very much twisted when dry, subovate broadly obtusate subobtuse, strongly recurved all around; cells subrhombic, the lowest near base deep-red numerous; costa r. but shortly excurrent. Capsule pale brown subclavate strangulate; neck longer. Tufts very tomentose, green above, not glossy. — Wet rocks r. *Amer.* Can. Pacif. distr.: Macoun Canad. musci n. 480.

b. Leaves not or slightly reflexed.

aa. Leaves small and green, more or less twisted when dry.

35.**B.flagellosum** Kindb. n. sp.

Leaves gen. ovate; cells subrhombic; costa sometimes short-excurrent. Uppermost leaves and those of flagelliform shoots ovate-oblong. Capsule brown oblong-piriform faintly constricted, smaller and shorter than in the last; neck short. Tufts dense tomentose. Habit of *B. cæspiticium.* — *Amer.* r. Can. Rocky mts: Macoun.

bb. Leaves not twisted, more or less strongly appressed when dry, large and mostly reddish.

36.**B.Mildei** Juratzka.

Leaves gen. ovate-oblong acute sometimes denticulate near apex; cells oblong-rhomboidal; costa green or brown-yellow not r. short-excurrent. Capsule reddish yellow finally brown. Tufts green us. silky or golden glossy, often very large. Very r. fruiting. — Earth and stones r. *Eur.* Switzerl!; Philibert. Belgium: Roemer.

37.**B.Atwateriæ** C. Mueller.

Leaves gen. arrounded at apex, not r. short-decurrent; lower cells red; costa not excurrent, finally crimson-red. Stem-leaves suboblong; cells oblong-lanceolate. Branch-leaves crimson-red gen. suboval with oblong-oval cells, sometimes narrower with narrower cells. Capsule us. red, not strangulate. Tufts 3—5 c. m. high, us. red not glossy. — Wet rocks r. *Amer.* princ. in Pacif. distr.: Macoun. U. S.: Henderson, com. Cardot.

38.**B.miniatum** Lesquereux.

Differs from the last: Leaves not decurrent, often green or brown; cells suboblong; costa green or at base red. Capsule smaller. — Wet rocks r. *Amer.* Can. Brit. Col. 1300 metr. a. sea; N. Foundl.: Waghorne.

39.**B.capitellatum** C. M. et Kindb. l. c.

Uppermost leaves suboblong subacute not arrounded at apex; cells somewhat narrow; costa green percurrent. Lowest leaves small oval round-obtuse distant finally reddish; costa red not percurrent. Tufts low golden glossy above or green. Capsules unknown. — Wet rocks near Pacific sea r. *Amer.* Can. Vanc. isl.: Macoun.

40.**B.corsicum** Kindb. n. sp. in litt. ad Levier.

Leaves flaccid pale red entire subobtuse, not distinctly reflexed, not densely appressed when dry; upper cells wide, the others somewhat narrow; costa pale red or yellowish not excurrent. Stem-leaves crowded ovate-oblong; branch-leaves suboblong distant decurrent. Capsules unknown. Tufts high. — *Eur.* r. Corsica: E. Levier.

5. Trichophora.

A. Leaves distinctly limbate.

a. Leaves, princ. the lower of stem, gen. sublingulate with long narrow base, us. obtusate; basal short-rectangular, upper rhomboidal. Us. dioecious.

41.**B.capillare** L.

Leaves gen. broad-limbate nearly entire and crowded, twisted when dry, us. green; limb us. yellowish. Capsule us. red-brown. — On dry stones and old roofs princ. in lower districts. *Eur.* common. Sweden, Germany, Switzerl. *Amer.* »U. S.»: Lesq. et Jam.

* **B.torquescens** Bruch.

Leaves dark-green or brownish, more acuminate. Capsule dark brown. Sometimes synoecious or monoecious. — *Eur.* r. Germany, Switzerl.! France: Philibert. Engl: Holt. Greece: Orphanides. »*Amer.*»: Lesq. et Jam.

* **B.restitutum** Notaris.

Leaves finally brown-red, entire obtuse; limb brown. Capsule dark brown. — *Eur.* r. Switzerl. near Lugano! »Italy near Como»: Notaris.

* **B.ruraliforme** Kindb. n. subsp.

Leaves brown-red strongly dentate subacute; limb brown. Shoot-leaves sometimes decurrent. Capsules unknown. Habit of *Barbula ruralis.* — *Amer.* r. Can. Vanc. isl.: Macoun 1893.

* **B.erythroloma** Kindb. n. subsp.

Leaves purplish red acute nearly entire; limb rose-red. — *Amer.* r. Can. Vanc. isl.: Macoun 1892.

* **B.Haistii** Schimper.

»Leaves small entire finally red; awn reddish. — Stone-walls r. *Eur.* Switzerl.»: Schimper.

42.**B.speirophyllum** Kindb. bull. soc. bot. ital. 1895.

Differs from *B. capillare:* Leaves narrowly limbate distant decurrent gen. entire, flaccid when moist, corrugate not twisted when dry. — Moist rocks. *Eur.* Sweden, Switzerl.! *Amer.* Can. Vanc. isl.: Macoun.

b. Leaves, princ. those of stem, subovate-lanceolate with not or slightly narrowed base, often acuminate, not or slightly twisted when dry; basal cells short-rectangular, upper rhomboidal. Dioecious.

43.**B.Donii** Greville.

Leaves nearly crowded and not decurrent, us. denticulate and broadly limbate. Upper shoot-leaves often rosulate. Capsule often very large. Tufts green or brown. — Dry stones in warmer distr. r. *Eur.* Italy: Levier; Arcangeli. Greece:

Heldreich. France: Corbière. *Amer.* Pacif. distr. Can.: Macoun. U. S.: Marshall A. Howe; Roell.

* **B.obconicum** Hornschuch.

Leaves nearly entire not rosulate. Capsule less large. — Walls and sandstone rocks r. *Eur.* Switzerl.! Engl.: Curnow, com. Holt. *Amer.* Can. Pacif. distr.: Macoun.

* **B.floridanum** Renauld et Cardot.

»Leaves shorter, narrower limbate not recurved. — *Amer.* r. U. S.»: Cardot.

44.**B.squarrosum** Kindb. in Hedwigia 1896 p. 66.

Fruiting stem very short; leaves crowded denticulate, less distinctly limbate. Leaves of sterile stems (shoots) broadly limbate gen. denticulate, distant decurrent spreading also when dry. Capsule not large. Tufts reddish brown. — *Amer.* r. U. S. Oregon near Astoria: Roell.

c. Leaves short narrowly limbate. Tufts low and dense. Dioecious.

aa. Leaves imbricate somewhat large, very concave.

45.**B.elegans** Esenbeck.

Leaves subobovate not or indistinctly recurved, only the upper limbate denticulate; cells subrhombic. Capsule large. Tufts green or finally reddish. — Calcareous rocks princ. in alps r. *Eur.* Switzerl. in alp. region!

b. Leaves small us. not imbricate; cells gen. oblong-rhombic.

46.**B.oreganum** Sullivant; Lesq. et Jam.

Leaves twisted: lower few very small; upper glomerate subovate abruptly acuminate, sometimes recurved. Tufts brown or finally reddish, very low. — *Amer.* r. Can. Brit. Col.: Macoun.

47.**B.streptophyllum** Kindb. n. sp.

Differs from the last: All leaves crowded nearly uniform: upper not larger and not recurved, very concave. Tufts green finally brown, less low. Capsules unknown. — *Amer.* r. Can. Brit. Col.: Macoun.

48.**B.trichophorum** Kindb. n. sp.

Leaves obtusate appressed neither recurved nor twisted: lower distant linear-oblong acute, upper crowded suboval. Tufts green. Capsules unknown. — *Amer.* r. Can. Vanc. isl. near sea: Macoun 1893.

B. Leaves not distinctly limbate.

a. Leaves, princ. the lower of stem, gen. sublingulate with long narrow base, as in *B. capillare*, us. twisted and crowded. Dioecious.

aa. Leaves not decurrent; cells large.

49.**B.Hendersoni** Renauld et Cardot.

Leaves large strongly dentate and recurved, twisted; awn short often dentate; upper shoot-leaves rosulate. Capsule large. Tufts green somewhat high. — Rocks r. *Amer.* Pacif. distr. Can. Vanc. isl. Macoun 1887 and 1893. U. S. Oregon: Henderson, com. Cardot.

50.**B.Sawyeri** Renauld et Cardot.

Leaves less large nearly entire not recurved, twisted. Capsule less large. Tufts green. — Logs and rocks r. *Amer.* Can.: Macoun. U. S.: Sawyer, com. Cardot.

51.**B.sanguilentum** Renauld et Cardot.

Leaves not large, recurved and nearly entire, not twisted. Capsule red not large. — Logs r. *Amer.* U. S. Calif.: M. A. Howe.

bb. Leaves decurrent; cells somewhat small.

52.**B.gemmascens** Kindb. n. sp.

Leaves small twisted entire not recurved: lower and middle distant short-decurrent narrowly sublingulate acuminate acute; comal leaves glomerate to a broadly clavate bud, suboval subobtuse. Tufts green. Capsules unknown. — Stones near sea. *Amer.* Can. Vanc. isl.: Macoun 1893.

b. Leaves, princ. those of stem, subovate-lanceolate, as in *B. Donii.*

53.**B.provinciale** Philibert.

Leaves crowded scarcely or not twisted, us. denticulate. Capsule often less large than in *B. capillare.* Tufts dense us. brown. Sometimes synoecious. — Calcareous soil r. *Eur.* France: Philibert. Greece: Heldreich.

* **B.crassirameum** Renauld et Cardot.

Leaves green entire more recurved. Tufts loose. — *Amer.* r. U. S.: Henderson, com. Cardot.

54.**B.extenuatum** Renauld et Cardot.

Leaves distant nearly entire gen. long-decurrent, twisted when dry. Tufts green not dense. — Logs and rocks r. *Amer.* Pacif. distr. Can.: Macoun. U. S.: Henderson, com. Cardot.

c. Leaves short as in *B. elegans,* not recurved; cells subrhombic. Dioecious.

aa. Leaves twisted when dry, not densely crowded. Capsules unknown.

55.**B.Stirtoni** Schimper; Braithwaite.

Leaves broadly subovate nearly entire subdecurrent not large. Tufts green. — *Eur.* r. Switzerl.! »Scotl.»: Braithw.

56.**B.tomentosum** Kindb. n. sp.

Leaves subovate nearly gradually acuminate, entire decurrent small. Tufts brown and very tomentose below, green above, dense and not low. — *Amer.* r. Can. Rocky mts: Macoun 1890.

bb. Leaves not distinctly twisted, nearly appressed when dry.

57.**B.heteroneuron** C. M. et Kindb. cat. Can. m.

Leaves suboval or subobovate often obtuse, entire or faintly denticulate, crowded and not large; awn sometimes wanting. Capsule less large than in *B. capillare.* Tufts us. reddish, not high; shoots clavate. — Rocks and roadsides r. *Amer.* Can. Brit. Col. and Vanc. isl.: Macoun.

58.**B.carinthiacum** Bryol. eur.

Leaves subobtuse cochleariform gen. not large: lower entire subobovate not crowded, upper ovate-oval us. denticulate. Tufts brown with green tops us. very high. Capsules not seen. — Moist rocks princ. in alps r. *Eur.* Switzerl.! Austria: Breidler, com. Warnstorf.

* **B.spelugense** Kindb. n. subsp.

Leaves larger, flaccid and not cochleariform: upper subobovate, middle short-decurrent; cells larger; awn sometimes indistinct. Capsules unknown. — Rocks in higher alp. region r. *Eur.* Switzerl. near Spluegen 1500 metr. a sea!

59.**B.Ferchelii Funck.**

Leaves small suboval-ovate subobtuse entire or faintly denticulate, gen. crowded and not decurrent; awn us. short. Capsule smaller than in *B. elegans*; lid mamillate. Tufts brown-green us. low. — Rocks princ. in alps, r. *Eur.* Norway, Switzerl.! *Amer.* »U. S.»: Cardot.

* **B.suecicum** Kindb. n. subsp.

Leaves gen. distant decurrent entire; awn long flexuous. Capsules not seen. Tufts brown below, dark green above, about 4 c. m. high. — Moist places r. *Eur.* Sweden Aongermanl. on the shore of a lake: H. W. Arnell.

6. Bimiformia.

A. Leaves distinctly decurrent, not (or slightly near base) reflexed, gen. broadly limbate; costa gen. percurrent. Dioecious.

60.**B.neodamense** Itzigsohn.

Leaves suboblong obtusate us. obtuse cucullate. Tufts us. brown-green. R. fruiting. — Swamps and rivulets. *Eur.* not common. Norway! Sweden: Lindberg. Spetsbergen: Berggren. Engl.: Rogers. Spain: Husnot.

* **B.ovatum** Juratzka.

Leaves oval-ovate more concave and large; the uppermost acuminate. Tufts green us. high. — *Eur.* r. Norway! Austria: Breidler. Finl.: Brotherus.

61.**B.denticulatum** Kindb. bull. Torr. club XVII.

Leaves oblong-lanceolate acuminate acute, distantly denticulate above to middle. Capsules unknown. — Springs and bogs r. *Amer.* Can. Cypress hills: Macoun.

62.**B.hydrophilum** Kindb. bull. Torr. club XVII.

Leaves narrowly ovate-lanceolate acuminate acute nearly entire. Capsules unknown. — Wet springy places r. *Amer.* Can. Vanc. isl.: Macoun.

B. Leaves decurrent, recurved nearly all around, acuminate acute.

a. Costa of leaves long-excurrent. Capsule narrow strangulate; neck us. long; teeth yellow; segments fenestrate.

63.**B.affine** Bruch. — Webera Bruch; Bryum Lindb.; B. cuspidatum Schimper.

Leaves gen. ovate-lanceolate and not broadly yellowish limbate, denticulate near apex, short-decurrent not or slightly twisted. Peristomial teeth pale. Stem not high. Pedicel not long. Habit of *B. pallescens.* Synoecious. — Stonewalls and rocks r. *Eur.* Norway! France: Renauld. Sweden: Grœnwall. Spain near Valencia: Dieck, com. Roell.

64.**B.revelstokense** Kindb. revue bryol. 1896.

Leaves ovate-lanceolate long-acuminate entire with pale not broad limb, much twisted when dry, short-decurrent exc. the uppermost glomerate. Pedicel very long. Tufts green tomentose 1—2 c. m. high. Dioecious. — Wet rocks r. *Amer.* Can. Brit. Col.: Macoun.

b. Costa of leaves not or shortly excurrent. Tufts us. high and tomentose, sometimes red.

65.**B.bimum** Schreber.

Leaves gen. ovate-oblong and denticulate near apex; limb broad yellowish. Perichetial leaves with not excurrent costa. Capsule brown not oblique; neck shorter; teeth pale. Synoecious. — Swamps and wet rocks not uncommon. *Eur.* Sweden, Norway, Switzerl.! *Amer.* Can.: Macoun. U. S.: Schrader, com. C. M.

66.**B.leucolomatum** C. M. et Kindb. cat. Can. m.

Leaves as in the last; limb pale. Perichetial leaves with excurrent costa. Capsule as in the last. Stem very high. Synoecious. — Marshes r. *Amer.* Can. Brit. Col.: Macoun.

67.**B.ventricosum** Dickson. — B. pseudotriquetrum Schwægr. Leaves as in *B. bimum.* Capsule brown sometimes slightly oblique; neck often long; teeth yellow. Dioecious. Very variable. — Wet places common also in alps. *Eur.* Sweden etc.! *Amer.* Can.: Macoun.

* **B.bimoideum** Notaris. — »Leaves nearly imbricate suberect; costa longer-excurrent. Lid of capsule long-apiculate. — *Eur.* r. Switzerl.»: Limpricht.

* **B.hyalodontium** C. M. et Kindb. l. c.

Capsule pale brown not oblique; teeth pale hyaline. — Wet rocks r. *Amer.* Can. Brit. Col.: Macoun.

68.**B.Reyeri** Breidler.

Differs from *B. ventricosum*: »Leaves longer finally reddish, narrowly limbate and nearly entire. Capsules unknown. — Dripping alp. rocks r. *Eur.* Austria: Breidler»: Limpricht.

C. Leaves not decurrent, broadly limbate and recurved gen. entire; costa excurrent.

a. Capsule strangulate with wide mouth. Tufts dense.

69.**B.pallescens** Schleicher.

Leaves gen. ovate-lanceolate, twisted when dry. Capsule pale brown or yellowish us. subclavate and not pendent when young; teeth pale. Tufts us. 2—3 c. m. high, often green. Often monoecious. — Earth and rocks also in alps, princ. the northern. *Eur.* not uncommon. Sweden, Norway, Switzerl.! *Amer.* Greenl.: Berggren. Can.: Macoun.

* **B.contextum** Hoppe et Hornschuch.

Leaves short-acuminate smaller. Capsule thicker and more distinctly strangulate; pedicel often only 1 c. m. long. Tufts brown-green often much higher. — Rocks princ. in alps. *Eur.* Norway!

70.**B.cirratum** Hoppe et Hornschuch.

Leaves gen. ovate or ovate-oblong, not or slightly curled. Capsule brown somewhat thick and pendent; teeth pale. Tufts green us. about 1 c. m. high and less compact than in the last. Spores in some alpine forms somewhat large. Us. synoecious. — On earth princ. on old roads in alps. *Eur.* not r. Norway, Switzerl.! *Amer.* r. Can.: Macoun.

* **B.sysphinctum** Limpricht.

Leaves denticulate near apex; costa short-excurrent. Capsule smaller thicker and more constricted with shorter neck. Sometimes monoecious. — In alps r. *Eur.* Norway!; Kaurin.

b. Capsule small-mouthed not constricted.

71.**B.subglobosum** Schliephacke.

»Leaves ovate-oblong not twisted; costa long-excurrent. Capsule subglobose-piriform; neck short; lid mamillate; teeth brown-yellow. Tufts dusky green less than 1 c. m. high. Synoecious or polygamous. — Alp. rocks r. *Eur.* Switzerl..: Græf»: Limpricht.

* **B.Bænitzii** C. Mueller.

Capsule oval-oblong finally piriform. Uppermost leaves sublanceolate. Tufts about 1 c. m. high. — Arctic distr. r. *Eur.* Norway: Bænitz, com. E. Adlerz.

72.**B.Lisæ** Notaris.

»Leaves oblong-lanceolate appressed when dry; costa long-excurrent. Capsule ovoid; neck scarcely shorter; lid mamillate; teeth brown-yellow. Tufts brownish loose about 1 c. m. high. Synoecious — On mountains r. *Eur.* Italy: Lisa»: Limpricht.

7. Cæspiticia.

A. Leaves distinctly limbate. Spores about or nearly 0,02 m. m.

a. Fertile stem nearly indistinct with glomerate leaves. Sterile shoots elongate julaceous. Dioecious.

73.**B.Jackii** C. Mueller.

»Leaves ovate-lanceolate acuminate, denticulate near apex, strongly recurved; costa long-excurrent. Capsule oval or subcylindric; lid blackish red. Tufts dense 3 c. m. high. — Alp. region r. *Eur.* Austria: Jack»: Limpricht.

b. Stem us. distinct; shoots not julaceous. Synoecious.

74.**B.stenotrichum** C. Mueller.

»Leaves small from broad-ovate base somewhat long-acuminate reflexed to acumen; costa long-excurrent. Capsule small suboblong; neck short; teeth short; cilia rudimentary; pedicel about 3 c. m. long. Tufts low. Fertile stem short with somewhat short shoots. Habit of *B. cæspiticium.* — Arctic distr. r. *Amer.* Alaska: Krause»: C. M. in Flora 1887.

75.**B.producticolle** Kindb. n. sp.

Leaves ovate-lanceolate reflexed; costa long-excurrent. Capsule narrow strangulate; neck long not curved; lid low short-apiculate; cilia long-appendiculate. Tufts about 1 c. m. high. Spores scarcely 0,02 m. m. — Rocks r. *Amer.* Can. Vanc. isl.: Macoun 1893.

76.**B.mamilligerum** Kindb. cat. Canad. m.

Leaves narrowly ovate-oblong not distinctly reflexed; costa long-excurrent. Capsule narrow not strangulate; neck long curved; lid low mamillate. Tufts 1—2 c. m. high. Fruiting stem 1—2 m. m. high. Spores larger than in the last. — Damp rocks r. *Amer.* Can. Rocky mts: Macoun.

77.**B.fuscum** Lindberg.

»Leaves ovate-lanceolate reflexed, denticulate above; costa short-excurrent. Capsule narrow faintly constricted; neck as long; lid short-conic; cilia long-appendiculate. Tufts about 1 c. m. high. Spores about 0,02 m. m. — Wet sand r. *Eur.* Finl.: Lindberg»: Limpricht.

B. Leaves not distinctly limbate.

a. Shoots julaceous. Leaves not or near base slightly reflexed. Dioecious.

78.**B.Funckii** Schwægrichen.

Leaves subovate very short-acuminate; upper cells dilated; costa short-excurrent. Capsule narrow strangulate; lid mamillate. Tufts loose very low. Spores sometimes about 0,02 m. m., often smaller. — Sand or gravel princ. in southern distr. *Eur.* not r. Sweden: R. Hartman; J. Persson.

79.**B.Kunzei** Hornschuch.

Leaves smaller nearly pellucid: those of stem suboblong; shoot-leaves broad-ovate longer acuminate; upper cells narrow; costa long-excurrent. Capsule narrow or subpiriform strangulate; lid mamillate. Tufts compact about 2 c. m. or higher. Spores about 0,01 m. m. — Dry earth also in alps r. *Eur.* Norway!

80.**B.occidentale** Sullivant.

Leaves small oval or suboblong often decurrent; upper cells narrow; costa short-excurrent. Capsule oblong wide-mouthed; lid apiculate. Tufts tomentose about 1 c. m. high. — *Amer.* r. U. S. Montana: Roell.

b. Shoots not distinctly julaceous. Spores small about 0,01 m. m. Usually dioecious. Capsule us. narrow.

81.**B.cæspiticium** L.

Leaves narrowly ovate-oblong or shorter, us. recurved all around; costa us. long-excurrent. Capsule strangulate us. yellowish brown; lid us. mamillate. Tufts about 2 c. m. high or lower. — Earth and rocks common. *Eur.* Sweden, Norway, Switzerl.! *Amer.* Can.: Macoun. U. S.: Schrader, com. C. M.

***B.badium** Bruch.

Capsule reddish brown; lid apiculate. Leaves sublimbate. Tufts loose. — Humid earth r. *Eur.* Austria: Breidler. Switzerl.: Pfeffer, com. Arnell.

* **B.comense** Schimper.

Leaves somewhat small, often slightly reflexed. Shoots sometimes subjulaceous. — Earth and walls r. *Eur.* Switzerl.!; Philibert.

* **B.oligochloron** C. M. et Kindb. l. c.

Leaves not or indistinctly reflexed, erect when moist. Shoots subjulaceous. Capsules unknown. — Rocks r. *Amer.* Can. Brit. Col.: Macoun.

* **B.pseudo-Kunzei** Limpricht.

»Leaves ovate-oblong gen. not recurved; costa short-excurrent. Tufts about 1 c. m. high. Synoecious. — In alp. region r. *Eur.* Switzerl.: Culmann»: Limpricht.

82.**B.microcephalum** C. M. et Kindb. l. c.

Differs from *B. cæspiticium*: Leaves narrower, lanceolate very long-acuminate; cells longer very narrow. Stem long proliferous with numerous small male buds. Capsules unknown. — Rocks r. *Amer.* Can. Brit. Col.: Macoun.

83.**B.vancouveriense** Kindb. bull. Torr. club XVI.

Leaves narrowly ovate-oblong reflexed below; cells smaller than in *B. cæspiticium*; costa denticulate above, sometimes short-excurrent. Capsule pale brown not constricted; lid low mamillate; pedicel about 5—6 c. m. long. Fruiting stem very short. — Wet earth in woods r. *Amer.* Can. Vanc. isl.: Macoun.

c. Shoots not julaceous. Spores about 0,02 m. m. Us. synoecious. Capsule us. not strangulate (exc. *B. Culmannii*).

aa. Capsule narrow.

84.**B.intermedium** Ludwig. — Mnium Ludw.; Bryum Bridel.

Capsule not strangulate; neck us. long often curved; lid acute; cilia short-appendiculate. Leaves reflexed narrowly ovate-oblong. Tufts green 1—2 c. m. high. — On earth princ. below alps. *Eur.* not r. Sweden, Norway, Switzerl.! France: Boulay. *Amer.* Can.: Macoun.

85.**B.clathratum** Amann; Limpricht.

»Capsule not strangulate; neck shorter often curved; lid low mamillate; cilia long-appendiculate. Leaves oval-oblong strongly recurved all around. Tufts brown-green about 1 c m. high. — Wet places in alp. region r. *Eur.* Switzerl.: Amann»: Limpricht.

86.**B.Culmannii** Limpricht.

»Capsule strangulate longer than the not curved neck; lid acute; cilia long-appendiculate. Leaves subovate, the upper recurved. Tufts bright green 2—4 c. m. high not tomentose. — In higher alp. region. *Eur.* Switzerl.: Culmann»: Limpricht.

bb. Capsule short thick gen. not distinctly constricted.

87.**B.synoico-cæspiticium** C. M. et Kindb. cat. Can. m.

Capsule large oval or obovate pendent; neck short; lid low mamillate; cilia appendiculate; pedicel geniculate below middle, arcuate at apex, 5—8 c. m. long. Leaves ovate- or ovate-oblong reflexed; costa long-excurrent, often denticulate above. Tufts about 1 c. m. high, radiculose only at base. — Gravel in alps r. *Amer.* Can. Brit. Col.: Macoun.

88.**B.lonchocaulon** C. Mueller.

»Leaves small reflexed all around, ovate-lanceolate subdecurrent; cells pellucid. Capsule small oval; cilia appendiculate, pedicel about 3 c. m. long. Stems subjulaceous elongate radiculose. Resembles somewhat *B. bimum* but more slender. — *Amer.* r. U. S. Colorado»: C. M. in Flora 1875.

89.**B.dovrense** Schimper.

»Leaves ovate suddenly short-acuminate indistinctly limbate faintly reflexed. Capsule oval-ovate yellowish; neck short; segments hyaline adhering to the yellowish teeth; cilia rudimentary; spores scarcely 0,02 m. m. Stem about 2 c. m., pedicel 1 c. m. long. Tufts tomentose green above. — Wet turfy soil in alps r. *Eur.* Norway near Kongswold in Dovrefjeld: Lorentz»: Schimper syn.

90.**B.cæspiticiiforme** Notaris.

»Leaves subovate reflexed in lower half, limbate in upper part. Capsule subpiriform small-mouthed; neck not long; lid low mamillate; teeth brown-yellow; cilia not appendiculate; pedicel 1 c. m. long, stem not longer. Tufts tomentose yellowish green. Monoecious. — In higher alp. region r. *Eur.* Switzerl.: Carestia»: Limpricht.

8. Gemmiformia.

A. Leaves not distinctly reflexed at borders, gen. not limbate.

91.**B.subrotundum** Bridel.

Leaves ovate-oblong short-acuminate acute gen. small; costa short-excurrent. Capsule pale brown oval or subglobose, with thick or indistinct neck; teeth yellow; segments long, gaping or fenestrate; cilia short r. appendiculate; lid small mamillate. Spores nearly 0,02 m. m. Us. monoecious. — Stony ground in alps and arctic districts r. *Eur.* Norway!; R. Hartman. *Amer.* Greenl.: Vanhoeffen. Can.: Macoun.

* **B.turfaceum** Kindb. in Botan. notiser 1896.

Leaves larger, sometimes narrowly limbate; costa gen. subpercurrent. Capsule larger, brown, more distinctly necked and faintly constricted when dry; cilia very short mostly wanting. Spores smaller. Stem more distinct. Dioecious. — Turfy soil in higher subalp. region r. *Eur.* Norway near Kongswold!

92.**B.gemmuligerum** Kindb. n. sp.

Leaves subovate obtusate small; those of shoots broader, obtuse; costa long-excurrent. Capsule brown oblong or obovate with short thick neck, distinctly constricted when dry, not large; teeth yellow; segments long fenestrate; cilia long appendiculate; lid large apiculate or mamillate. Spores about 0,01 m. m. Monoecious or dioecious. — *Amer.* r. Can. Assa: Macoun.

93.**B.subgemmuligerum** Kindb. n. sp.

Leaves subovate short-acuminate acute distinctly limbate somewhat small; costa short-excurrent. Capsule pale brown suboblong strangulate not large; neck distinct longish; segments entire; cilia long and long-appendiculate; lid mamillate not small; pedicel about 2 c. m. long. Spores gen. 0,02 m. m. Dioecious. — Sandy ground in subalp. districts r. *Eur.* Norway in Foldal near L. Elvedal 1897!

B. Leaves distinctly reflexed and limbate.

94.**B.microstegium** Bryol. eur.

Leaves narrowly ovate-lanceolate long-acuminate acute, reflexed often all around, not large; costa long-excurrent. Capsule pale brown suboblong with long and distinct neck, not large; teeth pale; segments long fenestrate; cilia long appendiculate; lid small apiculate. Spores nearly 0,02 m. m. Us. synoecious. — Dry earth in alp. regions r. *Eur.* Norway!

95.**B.submicrostegium** Kindb. in Botan. notiser 1896.

Leaves broadly ovate-lanceolate or ovate-oblong, acute gen. long-acuminate, reflexed all around and distinctly limbate (at least the upper of fruiting stem), not large; costa long-excurrent. Capsule pale brown oval-oblong short-necked gen. small; teeth yellowish; segments fenestrate shorter than basal membrane; cilia long appendiculate; lid small mamillate. Spores about 0,01 m. m. Dioecious or monoecious. — On earth in higher subalp. region r. *Eur.* Norway Tronfjeld and near Kongswold by Goverlivand!

96.**B.acutiusculum** C. Mueller.

»Leaves oblong acuminate; costa short-excurrent. Capsule oval-piriform with somewhat long curved neck, minute; teeth brownish; segments not perforated; cilia long, short-appendiculate above; lid small subacute. Dioecious. Habit of *B. subrotundum*. — Rocks in arctic districts r. *Amer.* Alaska: Krause»: C. M. in Flora 1887.

II. Pachylophus Kindb.

1. Argenteiformia.

A. Leaves gen. obtusate; costa (exc. *B. nitidulum*) not excurrent.

a. Leaves sparingly chlorophyllose, silver-glossy, not reflexed, not r. with hairpoint. Tufts low.

97.**B.argenteum** L.

Leaves subovate often apiculate; costa subhyaline not or r. confluent with hairpoint. Capsule oval-oblong strangulate blood-red or pale red. — Bare earth, stones and roofs. *Eur.* common. Sweden etc.! *Amer.* not r. Can.: Macoun. U. S.: Langlois, com. Cardot.

b. Leaves distinctly chlorophyllose, not reflexed. Capsules unknown.

98.**B.veronense** Notaris. — Argyrobryum virescens Kindb. Laubm. S. u. N.

Leaves broad-ovate or ovate-oblong, obtuse, reddish at base; cells rhombic shorter than in *B. argenteum*; costa yellow abbreviate. Branches subclavate pale green. Tufts sometimes 2—3 c. m. high. — In water on stones and sand r. *Eur.* Norway!; Kaurin. *Amer.* Labrador: Waghorne.

c. Leaves chlorophyllose, more or less reflexed.

99.**B.Blindii** Br. eur. — B. Kiærii Lindb.

Leaves oval-oblong subobtuse: only uppermost (narrowly) reflexed. Capsule blood-red obovate; cilia sometimes not appendiculate. Dioecious. — Wet sand princ. by rivers, r. on rocks, r. *Eur.* Norway!; F. Kiær. France: Boulay. *Amer.* Can.: Macoun.

* **B.oblongum** Lindberg.

Leaves more obtuse. Capsule sometimes suboblong. — Wet sand r. *Eur.* Norway!; Kaurin. Finl.: Brotherus.

100.**B.teres** Lindberg.

Leaves broad-ovate obtuse: only uppermost apiculate and reflexed. Capsule pale brown suboblong; cilia appendiculate; pedicel about 1 c. m. long. Resembles somewhat *B. calophyllum*. — Arctic district r. *Eur.* Spetsbergen: Berggren.

101.**B.bulbifolium** Lindberg.

»Leaves ovate obtuse with deflexed point: only uppermost reflexed. Capsule brown-red obovate; cilia appendiculate. Stem nearly indistinct with gemmiform shoots. Synoecious. — Arctic district r. *Eur.* Lapland: Norrlin»: Lindberg.

102.**B.nitidulum** Lindberg.

Leaves subovate subobtuse, narrowly limbate, recurved all around; costa sometimes short-excurrent. Capsule obovate pale yellow or brown. Stem short; shoots subgemmiform with somewhat loosely disposed leaves. Synoecious or monoecious. — Northern, princ. arctic districts r. — *Eur.* Spetsbergen: Berggren. Norway: Kaurin. *Amer.* Greenl.: Vanhoeffen.

B. Leaves short-acuminate; costa, at least in uppermost leaves, excurrent. Capsule not or indistinctly constricted below mouth.

103.**B.atropurpureum** Wahlenberg.

Leaves subovate gradually acuminate, reflexed below; upper shoot-leaves glomerate. Capsule blood-red suboval; teeth yellowish or pale red; cilia appendiculate. Tufts small pale green 0,5—1 c. m. high, often with gemmiform propagula. Dioecious. — Sandy earth and stone-walls. *Eur.* not uncommon. Sweden, Germany! *Amer.* r. Can.: Macoun.

* **B.californicum** Sullivant.

Leaves faintly reflexed. Capsule red oblong. »Cilia not appendiculate»: Lesq. et Jam. — *Amer.* r. U. S.: Bolænder, com. Cardot.

* **B.arenarium** Juratzka.

»Leaves shorter, less reflexed; cells shorter. Capsule red-brown. — Sometimes inundated places r. *Eur.* Austria: Juratzka»: Limpricht.

104.**B.Garovaglii** Notaris.

»Leaves subovate short-acuminate, gen. not reflexed; costa scarcely excurrent. Capsule chestnut-brown broad-oval; teeth brown-yellow; cilia appendiculate. Tufts small dusky green, scarcely 1 c. m. high. Synoecious. Habit of *B. atropurpureum.* — Alp. districts r. *Eur.* Italy: Garovaglio»: Limpricht.

* **B.confertum** Limpricht.

»Leaves broader, those of shoots obtuse. Tufts very dense, pale green above, 2—2,5 c. m. high. Capsules unknown. — Alp. rocks r. *Eur.* Austria: Breidler»: Limpricht.

105.**B.microglobum** C. M. et Kindb. cat. Can. m.

Leaves ovate-oblong short-acuminate, reflexed below; upper cells short; costa short-excurrent. Upper shoot-leaves glomerate ovate obtusate not reflexed. Capsule small pale red subobovate or subglobose; pedicel 3 c. m. long. Tufts green and dense, radiculose below, about 1 c. m. high. — Earth r. *Amer.* Can. Ont.: Dearness, com. Macoun.

2. Versicoloriformia.

106.**B.versicolor** Al. Braun.

Leaves ovate-oblong or ovate-lanceolate, acuminate acute, reflexed crowded not decurrent. Capsule finally reddish, round-oval. Stem very short. Tufts scarcely 1 c. m. high. — Wet sand princ. by rivers r. *Eur.* Austria: Venturi; Gander. Germany: Progel.

107.**B.coronatum** Schwægrichen.

Leaves as in the last but looser disposed and not reflexed; those of shoots decurrent. Capsule yellowish or pale brown, oval-oblong. — *Amer.* r. »U. S.»: Lesq. et Jam. (Cuba: Wright, com. C. Mueller).

108.**B.excurrens** Lindberg.

Leaves subovate abruptly acuminate acute more or less reflexed, crowded and not decurrent. Capsule small pale red oval or subobovate. Tufts reddish about 1 c. m. high. — Sandy alp. places r. *Eur.* Norway in Dovrefjeld!

3. Zonatiformia.

A. Tufts dense and tomentose.

109.**B.zonatum** Schimper.

Leaves subovate short-acuminate apiculate, neither limbate nor reflexed, subdecurrent, large and not densely crowded; costa of the uppermost leaves often short-excurrent. Capsules and flowers unknown. Tufts very compact, zonate, brown below, often high. — Alp. rocks r. *Eur.* Norway in Dovrefjeld!

110.**B.zonatiforme** Kindb. in Botan. notiser 1896.

Leaves subcircular obtusate subobtuse, sometimes (narrowly) limbate, crowded: uppermost apiculate; costa not excurrent. Habit of the last, but tufts are lower, about 2—3 c. m., and wholly brown. Capsules and flowers unknown. — Alp. rocks r. *Eur.* Norway in Dovrefjeld!

111.**B.Limprichtii** Kaurin.

Differs from *B. zonatum*: Leaves broad-ovate obtusate, either subobtuse or abruptly apiculate, more crowded and less large. Tufts less tomentose often green, 2 c. m. or higher. Polygamous. Capsule pale brown suboblong or subobovate, not constricted; lid small; cilia unknown. — Higher alp. region r. *Eur.* Norway in Dovrefjeld 1500 m. a. s.!; Kaurin.

B. Tufts loosely cohering, not tomentose.

112. **B. Gerwigii** C. Mueller. — Hypnum C. M.; Bryum Limpr. Leaves broad-ovate subobtuse, neither limbate nor reflexed, not densely crowded, whitish green, sometimes sparingly chlorophyllose. Stems about 3 c. m. high. Capsules and flowers unknown. — Inundated rocks r. *Eur.* Switzerland: Gerwig, com. C. Mueller.

IV. Cladodium Schimper, in part.

1. Erythrodontia.

113. **B. Marratii** Wilson.

Leaves oval-oblong blunt not or scarcely reflexed. Capsule subglobose; cilia indistinct; pedicel 2—3 c. m. long. Stem very short. — Wet places near sea r. *Eur.* Engl.: Rogers; Percival. Netherland: Buse.

2. Arcticiformia.

A. Capsule us. abruptly narrowed to the very small mouth. Leaves not crowded.

114. **B. arcticum** R. Brown. — Pohlia R. Br.; Bryum Br. eur. Leaves suboblong, more or less reflexed, broadly red-limbate, finally rose-red or purplish; costa percurrent or short-excurrent, finally red. Lower shoot-leaves decurrent. Capsule thick suboval often oblique, brown; teeth and endostome orange; cilia not appendiculate. Fruiting stems very short, scarcely tufted; shoots short, radiculose at base. — Earth in alp. region princ. in northern districts r. *Eur.* Norway! *Amer.* very r. Can.: Macoun.

115. **B. flavescens** Kindb. enum. bryin. dovr.; rev. bryol. 1896. Leaves suboblong scarcely reflexed us. broadly yellow-limbate, often finally brown-red, sometimes decurrent; costa short-excurrent yellowish or brown. Capsule thick subobovate oblique often curved, finally brown; teeth and endostome yellowish; cilia often appendiculate. Stems as in the last, more distinctly tufted. — Alp. rocks r. *Eur.* Norway near Kongswold!

116. **B. Lindbergii** Kaurin.

Agreeing with the last in often appendiculate cilia. Differs from it in leaves longer, oblong-lanceolate, and green; stems higher, densely tufted. Us. monoecious or dioecious. — Moist alp. rocks r. *Eur.* Norway!

B. Capsule not abruptly narrowed to the less contracted mouth. Leaves yellowish green and yellowish-limbate, not red. Stem more distinct, radiculose in lower half.

a. Capsule yellowish; teeth orange; cilia not appendiculate. Leaves oblong-lanceolate, broadly limbate. Us. synoecious.

117.**B.arcuatulum** (Limpricht) Kindb. (new name). — B. arcuatum Limpr., non Hooker et Wilson.

Leaves distant scarcely reflexed, decurrent; costa often long-excurrent. Capsule subclavate often oblique and curved; endostome yellow. Stems not or loosely tufted. — Moist alp. rocks r. *Eur.* Norway!; Kaurin.

118.**B.callistomum** Philibert.

Differs from the last in capsule thicker, subobovate, neither oblique nor curved, pale yellow; endostome orange. — Alp. rocks r. *Eur.* Norway!

119.**B.Kindbergii** Philibert. — B. schisticola Kindb. mscr.

Leaves crowded, often reflexed below middle, not decurrent, pale-yellowish limbate; costa gen. long excurrent. Capsule not (or indistinctly) oblique nor curved, thick and subobovate, faintly constricted below the not red mouth; endostome yellow; lid mamillate. Shoot-leaves not distinctly limbate. Spores scarcely 0,03 m. m. Tufts dense. — Rocks of micaschiste in alps r. *Eur.* Norway, higher subalp. region near Kongsvold 900 mtr. a. s.!; growing together with *Myurella tenerrima.* »Switzerl.»: Philibert.

* **B.helveticum** Philibert.

»Leaves narrower, subdecurrent and reddish. Capsule suboblique. — *Eur.* r. Switzerl.»: Philibert.

b. Capsule brown; teeth and endostome yellowish; cilia often appendiculate. Leaves suboblong indistinctly or somewhat narrowly limbate. Monoecious.

120.**B.stenocarpum** Limpricht.

Leaves not crowded, reflexed, sometimes decurrent; costa somewhat longly excurrent. Capsule narrowly obovate, scarcely oblique or curved. Spores large. Habit of *B. Sauteri.* Tufts low brown-green. — Alps r. *Eur.* Norway!

3. Cernuiformia.

A. Leaves gen. somewhat twisted when dry. Tufts green or brownish, us. loose. Cilia of endostome not appendiculate. Male flowers gemmiform. Spores large.

121.**B.cernuum** Swartz. — Didymodon Sw.; Bryum Lindb.; B. uliginosum Br. eur.

Leaves not decurrent, oblong-lanceolate long-acuminate, reflexed below, broadly yellowish-limbate us. serrulate near apex; costa percurrent or short-excurrent. Capsule subobovate or clavate, oblique and curved, pale or finally reddish brown; teeth brown-yellow; lid subconic mamillate; pedicel long. Tufts olive-green or brown, radiculose at base, 1—2 c. m. high. Monoecious. — Wet places princ. below alps. *Eur.* not uncommon. Sweden!; S. J. Lindgren. *Amer.* r. Can.: Macoun.

122. **B. calcareum** Venturi.

Leaves decurrent, oblong-lanceolate or sublingulate, long-acuminate, scarcely reflexed, narrowly limbate; costa short-excurrent. Capsule subclavate r. curved, brown; teeth yellowish; lid subconic obtuse; pedicel somewhat long. Tufts green, radiculose at base, about 1 c. m. high. Monoecious. — Calcareous caverns in alp. region r. *Eur.* Austria 2100 metr. a. s.: Venturi.

123. **B. luridum** Ruthe.

Leaves not decurrent, oval-oblong long-acuminate, reflexed all around, broadly brown-limbate, brown at apex; costa long-excurrent. Capsule us. thick, suboval or round-oval, not oblique and scarcely curved, pale brown; teeth yellow; lid convex or subconic, obtuse or mamillate; pedicel somewhat long. Tufts low and greenish, radiculose. Synoecious. — On earth below alps r. *Eur.* Germany: Ruthe, com. Warnstorf.

B. Leaves not twisted, yellowish or finally red. Tufts dense. Cilia appendiculate. Spores sometimes not large. Male flowers disciform.

124. **B. meeseoides** Kindb. bull. Torr. club XVI.

Leaves not decurrent, ovate-oblong or broadly ovate-lanceolate, not distinctly reflexed, faintly denticulate, brown-limbate; costa abbreviate or subpercurrent. Capsule shorter than neck, narrowly piriform or subclavate, us., princ. unripe, arcuate (*Meesea*-like); teeth pale yellow; basal endostomial membrane nearly indistinct; lid mamillate; pedicel long. Stem often longish. Dioecious. — Wet rocks r. *Amer.* Can.: Macoun. Alaska: J. M. Macoun.

4. Purpurascentiformia.

A. Stems not or loosely tufted. Leaves gen. narrowly limbate.

a. Spores gen. not large, about 0,02 m. m. Capsule gen. narrow; cilia not appendiculate; pedicel long. Leaves decurrent, faintly reflexed us. rose-red; costa gen. subpercurrent. Stems gen. very short and scarcely or not cohering; shoots long loosely foliate. Us. synoecious.

125. **B. purpurascens** R. Brown. — Pohlia R. Br.; Bryum Br. eur.

Leaves short-decurrent suboblong or oblong-lanceolate, more or less limbate. Capsule suboblong pale yellow or finally pale brown; teeth yellow; lid large deplanate, mamillate or subapiculate. — Sandy places by rivers and rivulets in northern alps r. *Eur.* Norway; Sweden: Arnell. Finl.: Brotherus. *Amer.* Greenl.: Berggren. Alaska: J. M. Macoun. Can.: J. and J. M. Macoun; Breutel.

* **B.opdalense** Limpricht.

Leaves shorter, more distinctly limbate. Capsule with shorter neck. — *Eur.* Norway!; Kaurin.

* **B.autumnale** Limpricht. — »Webera hermaphrodita Ren. et Card.»: Waghorne.

Leaves suboval, longer decurrent. Shoots shorter, yellowish green. Capsule somewhat longer necked; teeth brown-yellow; lid apiculate. — R. *Eur.* Norway!; Kaurin. *Amer.* Can.: Waghorne.

126.**B.subpurpurascens** Kindb. cat. Can. m.

Leaves long-decurrent oblong-lanceolate reddish limbate rose-red; costa scarcely excurrent. Capsule very narrow, distinctly strangulate, curved when unripe; teeth orange; lid large conic obtuse. Spores smaller than in the last; fruiting stem more distinct. Dioecious. — Wet earth r. *Amer.* Can. Brit. Col. by a railway: Macoun.

b. Spores gen. very large. Capsule gen. thick; teeth orange, incurved when dry; pedicel us. very long and thick. Leaves gen. not decurrent, more or less reflexed. Cilia gen. not appendiculate (»in Californian specimens sometimes long-appendiculate»: Lesq. et Jam.). Stems and shoots short.

127.**B.warneum** Blandow. — B. oelandicum Philibert.

Leaves not crowded, gen. narrow-limbate and faintly reflexed, sometimes short-decurrent, suboval, sometimes denticulate above, often finally rose-red; costa percurrent or short-excurrent. Capsule large oval-globose reddish yellow or finally reddish brown; lid convex mamillate. Spores often about 0,05 m. m. Sometimes synoecious. The »flagelliform shoots», delineated in Br. eur., not are essential. — Wet sand, princ. near sea, r. in alps, r. *Eur.* Sweden! Germany: Warnstorf. France: Boulay. *Amer.* »U. S.»: Lesq. et J.

128.**B.Biddlecomiæ** Austin. — B. Edwardsianum C. M. et Kindb. l. c.

Differs from the last in leaves narrower, longer acuminate, entire, more distinctly limbate and reflexed; costa long-excurrent. Capsule narrower, less inflated, more strangulate; lid lower. — Damp sandy soil r. *Amer.* Can., Prince Edw. isl.: Macoun. »U. S., Colorado»: Lq. et J.

129.**B.mamillatum** Lindberg.

Upper leaves glomerate not decurrent, broadly limbate, reflexed ovate-lanceolate entire green; costa short-excurrent. Capsule thick subovate brown-yellow; lid deplanate mamillate; pedicel long. Spores less large than in *B. warneum*. — On shores of Baltic sea r. *Eur.* Sweden: Zetterstedt.

130.**B.serotinum** Lindberg.

Differs from the last in leaves narrow-limbate, cells narrower; capsule longer necked, pedicel less long; stems more distinct, less loosely tufted. — Wet sand r. *Eur.* Sweden: H. W. Arnell.

B. Tufts dense. Leaves gen. broadly limbate.

a. Fruiting stem distinct with somewhat long loosely foliate shoots. Capsule gen. narrow.

131.**B.Brownii** Bryol. eur.

Leaves green not crowded, subdecurrent and narrowed at the orange-colored base, reflexed below, ovate-oblong or narrower; costa yellowish often long-excurrent. Stem-leaves broadly limbate; shoot-leaves less distinctly limbate with short-excurrent costa. Capsule pale finally brown-yellow; cilia not appendiculate; lid apiculate; pedicel often long. Stem and shoots radiculose in lower half. Us. monoecious. — Wet rocks and swamps in alp. northern regions r. *Eur.* Norway! *Amer.* Greenl: Berggren.

132.**B.erubescens** Kindb. cat. Canad. m.

Stem-leaves red-brown crowded not decurrent, broadly reddish or brownish limbate, scarcely reflexed, ovate-oblong; costa red-brown somewhat long-excurrent. Shoot-leaves narrower limbate, sometimes short-decurrent. Capsule finally pale brown, distinctly strangulate; cilia appendiculate; lid mamillate; pedicel not long. Spores large. Dioecious. — Rocks r. *Amer.* Can. Rocky mts: Macoun.

b. Fruiting stem very short with short shoots. Us. synoecious.

133.**B.Lindgrenii** Schimper. — »B. purpurascens»: Lindgren musci suec. exsicc.

Leaves crowded not decurrent, often reflexed, ovate-oblong short-acuminate, often denticulate above; costa subpercurrent. Capsule suboblong not large, pale brown; teeth brown-yellow; cilia not appendiculate; lid deplanate mamillate; pedicel somewhat long. Tufts small yellowish green or pale red. — On the shore of a lake (Wenern) r. *Eur.* Sweden near Lidkœping: S. J. Lindgren.

134.**B.micans** Limpricht.

Leaves not crowded, subdecurrent, reflexed at base, oval-oblong or sublanceolate; costa, only of uppermost leaves, short-excurrent. Capsule somewhat small, thick suboval brownish; teeth orange, incurved when dry; cilia not appendiculate; lid subconvex mamillate; pedicel not long. Tufts brown-green. — Turfy soil in northern alps r. *Eur.* Norway!; Kaurin. *Amer.* Greenl.: Berggren.

* **B.inflatum** Philibert.

»Leaves more decurrent; costa longer excurrent. Capsule thicker. — Northern alps r. *Eur.* Norway»: Kaurin.

135.**B.pycnodermum** Limpricht.

Leaves not crowded, subdecurrent, reflexed at base, oblong-lanceolate long-acuminate; costa of uppermost leaves long-excurrent. Capsule suboblong dark brown, finally blackish; teeth brown-yellow; cilia appendiculate; lid deplanate mamillate; pedicel often long. Habit of *B. cirratum.* — Wet sand by water in northern alps r. *Eur.* Norway!; Kaurin.

5. Calophylloidea.

136.**B.calophyllum** R. Brown.

Leaves broad-ovate obtusate (obtuse or acute), often sublimbate, not reflexed, sometimes decurrent; cells large; costa not excurrent. Capsule suboval; cilia sometimes appendiculate; pedicel us. long, often 3 c. m. or more. — Swamps princ. in alps r. *Eur.* Norway! Engl.: Rogers. Spetsbergen: Berggren. *Amer.* Greenl.: Vanhoeffen.

137.**B.acutum** Lindberg.

Leaves ovate-oblong acute more or less acuminate, often narrowly limbate and reflexed below, not decurrent; cells smaller than in the last; costa often short-excurrent. Capsule us. suboblong and long-pedicellate; cilia smooth. Stem not high. — Sandy borders of rivers r. *Eur.* Finland: Brotherus. (*Asia*, Sibiria: Arnell).

* **B.Axel-Blyttii** Kaurin.

Capsule subobovate shorter-pedicellate. — Sand by rivers in alps r. *Eur.* Norway!; Kaurin.

6. Penduliformia.

A. Leaves gen. not distinctly (or very narrowly) limbate; costa gen. not excurrent. Us. synoecious.

a. Spores large, about 0,04 m. m.

138.**B.brachyneuron** Kindb. Ottawa Naturalist V.

Leaves small broad-ovate short-acuminate reflexed narrowly limbate, nearly crowded, sometimes short-decurrent: comal glomerate; upper cells subrhombic; costa often abbreviate. Capsule thick round-oval or subobovate, somewhat long-necked and constricted below mouth, reddish brown; teeth broader than in *B. pendulum;* segments also orange, adhering; pedicel about 1 c. m. long, scarcely emerging above tufts. Fruiting stem distinct and tomentose; shoots short. — Arctic district r. *Amer.* Alaska: J. M. Macoun.

b. Spores somewhat small, about 0,02 m. m. Leaves not decurrent.

139.**B.lacustre** Blandow. — »B. Barnesi Wood»: Limpricht.

Leaves ovate-oblong short-acuminate acute not or indistinctly limbate, broadly recurved nearly all around, entire; costa gen. subpercurrent. Capsule small suboval short-necked; lid small; teeth pale yellow; pedicel long. Stems very short, loosely tufted; shoots filiform. — Wet sand often near lakes, princ. below alps. *Eur.* not r. Norway! Finland: Lindberg. Germany: Warnstorf. England: Rogers.

140.**B.Knowltoni** Barnes bot. gazette 1889.

»Leaves ovate to obovate-lanceolate short-acuminate, us. indistinctly limbate, slightly revolute or plane, entire or nearly so; costa not or shortly excurrent. Capsule oblong-piriform; cilia rudimentary; lid small; pedicel about 1 c. m. long. Tufts dense and tomentose, 1—2 c. m. high. Spores about 0,025 m. m. — Crevices in rocks r. *Amer.* Can. N. Foundl.»: Barnes.

141.**B.flexuosum** Austin.

Differs from *B. lacustre* in leaves pale red not reflexed; capsule narrower; lid large; tufts dense less low. Dioecious. — Gravelly ground near water r. *Amer.* Can. Brit. Col.: Macoun.

B. Leaves broadly limbate, loosely disposed and decurrent (at least the lower). Us. monoecious.

142.**B.Moëi** Schimper.

»Leaves very narrow, ovate-lanceolate long-acuminate entire: upper reflexed; apical cells suboblong; costa long-excurrent. Capsule thick suboval not constricted; lid small flat mamillate; teeth orange. Tufts sparingly radiculose, 2 c. m. high. — Northern alps r. *Eur.* Norway: N. G. Moë»: Schimper and Limpricht.

143.**B.paludicola** Schimper.

»Lower leaves small, subovate short-acuminate acute, loosely disposed: upper somewhat large, crowded, gen. broad-oval, reflexed all around, yellow-limbate; costa short-excurrent. Capsule subpiriform dark fuscous; lid mamillate somewhat large; teeth yellow, orange below; pedicel 3 c. m. long. Tufts dense 2—3 c. m. high. Spores about 0,03 m. m. Sometimes synoecious. — Swamps in alps r. *Eur.* Norway near Kongswold: Lorentz»: Schimp. and Limpricht.

C. Leaves gen. narrowly limbate not decurrent us. crowded; costa excurrent. Us. synoecious.

a. Leaves not (or only at base) reflexed. Fruiting stem nearly indistinct with very short shoots. Capsule thick, smaller than in *B. pendulum.* Spores large. Comal shoot-leaves gen. not glomerate.

144.**B.archangelicum** Bryol. eur. — »B. Holmgrenii Lindb.»: Kaurin.

Leaves ovate-oblong short-acuminate; apical cells subrhombic; costa long-excurrent. Capsule subobovate; peristome pale yellow; segments free; lid flat mamillate; pedicel short. — Bare earth in alp. regions r. *Eur.* Norway!; Kaurin. Sweden: E. Adlerz. Russian Lapland: Aongstrœm. *Amer.* Can.: Macoun.

145.**B.planifolium** Kindb. Laubm. Schw. u. Norw.

Leaves broad-ovate short-acuminate; middle cells rhomboidal, apical scarcely narrower; costa not long-excurrent. Capsule subpiriform; peristome orange; segments adhering; lid apiculate not deplanate; pedicel not long. — Alp. rocks r. *Eur.* Norway, Dovrefjeld!

b. Leaves reflexed, us. all around.

aa. Peristomial teeth pale; segments yellow. Capsule subglobose very small. Spores somewhat small, about 0,02 m. m.

146.**B.globosum** Lindberg.

Leaves oval acuminate acute, reflexed to above middle, entire; costa of uppermost leaves short-excurrent to a deflexed point. Capsule pale reddish-yellow; lid small; pedicel short. Stems very short; tufts dense about 0,5 c. m. high. — Arctic district r. *Eur.* »Spetsbergen»: Lindberg. (*Asia,* Sibiria: Sahlberg, com. Brotherus.)

bb. Peristomial teeth brown-yellow; segments yellow. Capsule suboval. Spores about 0,03 m. m.

147.**B.Græfii** Schliephacke.

Upper leaves gen. ovate-oblong, reflexed all around, entire; costa more or less excurrent. Capsule brownish not constricted; lid small; pedicel about 1,5 c. m. long. Stem very short with short shoots. Tufts about 0,8 c. m. high or lower, sometimes loose. — Schistose rocks in alps r. *Eur.* Norway: Hagen.

148.**B.Lorentzii** Schimper.

Differs from the last: »Upper leaves longer acuminate. Capsule constricted below mouth, longer necked; pedicel about 3 c. m. long. Stem with longer shoots, their leaves decurrent. — Turfy soil near Atlantic sea r. *Eur.* Norway»: Jörgensen in Christiania Vidensk. Selsk. Forhandl. 1894.

149.**B.Kaurinianum** Warnstorf.

Differs from *B. Græfii:* Upper leaves with long-excurrent costa. Pedicel of capsule 4—5 c. m. long. — Schistose rocks in alps r. *Eur.* »Norway near Kongswold in Vaarstien»: Kaurin; Sweden in Lapland near Virijaur: Miss A. Cleve, com. E. Nyman.

cc. Peristome gen. orange. Capsule sometimes narrow. Spores gen. large. Fruiting stem us. distinct.

150.**B.pendulum** Hornschuch. — Ptychostomum Hsch.; Bryum Schimper.

Leaves ovate-oblong narrowly acuminate, reflexed all around: comal (also on shoots) glomerate; apical cells narrow; costa often long-excurrent. Capsule thick suboval; neck short; segments often not well-evolute; lid us. apiculate; pedicel gen. not long. Fruiting stem tomentose in lower half; shoots short. — Earth and rocks also in alps. *Eur.* not uncommon. Sweden, Norway, Germany, Switzerl.! France: Renauld. *Amer.* Greenl.: Berggren. Alaska: J. M. Macoun. Can.: J. Macoun; Waghorne.

151.**B.compactum** Hornschuch.

Differs from the last in leaves narrower and longer acuminate; capsule narrow subclavate; segments not adhering. Us. monoecious. — Alps r. *Eur.* »Germany»: Limpricht. *Amer.* Greenl.: Vanhoeffen.

152.**B.Roellii** Philibert.

Leaves narrowly ovate-oblong, longer acuminate than in *B. pendulum*, reflexed nearly all around, not distinctly limbate in upper part; upper and middle cells narrow; costa sometimes short-excurrent. Capsule narrow suboblong, sometimes scarcely longer than neck; lid apiculate; pedicel somewhat long. Fruiting stem nearly indistinct with gemmiform shoots. Spores smaller than in *B. pendulum.* — *Amer.* r. U. S.: Roell, com. Brotherus. Can. Cypress hills: Macoun 1894.

153.**B.angustirete** Kindb. bull. Torr. club XVI.

Differs from *B. pendulum:* Stem-leaves more distinctly limbate and strongly recurved. Capsule narrowly oblong; lid not apiculate; pedicel long; spores smaller. Shoots longer, not thicker above; their leaves longer acuminate with narrower cells. — *Amer.* r. Can.: Macoun.

154.**B.alaskanum** Kindb. n. sp.

Leaves broad-ovate apiculate or very short-acuminate, reflexed all around; cells wide, the upper subrhombic; costa short-excurrent. Capsule short but not thick, subclavate-piriform; lid convex mamillate; pedicel not long. Fruiting stem tomentose with shorter and longer shoots. Uppermost leaves of stem and shorter shoots glomerate; those of longer shoots not glomerate. — Arctic district r. *Amer.* Alaska: J. M. Macoun.

D. Leaves gen. broadly limbate and not (or only on shoots) decurrent, us. crowded; costa excurrent. Us. synoecious.

a. Spores very large, about 0,04—0,05 m. m.

155.**B.longisetum** Blandow.

Leaves ovate-oblong acuminate, not reflexed above, smaller than in *B. inclinatum*: the uppermost not distinctly glomerate; upper cells narrow; costa short-excurrent. Capsule thick suboval short-necked; lid convex apiculate; teeth yellow; pedicel us. 5—10 c. m. long. Stems very short or nearly indistinct, not densely cohering; shoots short. — Swamps and turf-moors also below alps r. *Eur.* Norway! Germany: Holler, com. Warnstorf.

* **B.labradorense** Philibert.

Leaves somewhat shorter and broader; costa longer excurrent. Capsule shorter; pedicel gen. about 3 c. m. long. — Alp. swamps r. *Eur.* Norway! *Amer.* »Can.»: Philibert.

156.**B.murmanicum** Brotherus.

Leaves ovate acuminate, reflexed all around: the uppermost glomerate; upper cells suboblong; costa short-excurrent to an often deflexed point. Capsule broad-oval somewhat long-necked; lid flat apiculate; teeth pale; pedicel 3 c. m. long. Stem about 1 c. m. high. Tufts dense blackish about 2,5 c. m. high; shoots glossy green. — Wet sand by rivers r. *Eur.* Russian Lapland: Brotherus.

b. Spores less large, about 0,03 m. m. or smaller. Upper leaves reflexed all around.

aa. Upper leaves obtusate or short-acuminate. Capsule subglobose scarcely longer than neck.

157.**B.salinum** Hagen.

Upper leaves ovate-oblong acute; costa somewhat long-excurrent (in lower leaves not excurrent). Capsule pale brown not constricted below mouth; lid small apiculate or rostellate; teeth orange; pedicel about 1 c. m. long. Tufts dense greenish about 1,5 c. m. high. — On shores of Atlantic sea r. *Eur.* Norway: I. Hagen.

bb. Upper leaves us. long-acuminate. Capsule gen. suboblong, longer than neck.

158.**B.inclinatum** Swartz. — Pohlia Sw.; Bryum Br. eur.

Leaves narrowly ovate-oblong, the uppermost (also on shoots) us. glomerate; upper cells narrow; costa sometimes not long-excurrent. Capsule gen. suboblong; lid short-conic; pedicel about 3—4 c. m. long. Stem very short with short shoots. — On earth also in alps. *Eur.* not uncommon. Sweden, Norway! Finl.: Brotherus. *Amer.* Can.: J. Macoun; Waghorne. Alaska· J. M. Macoun.

159.**B.lapponicum** Kaurin.

Differs from the last: Leaves broader, subovate not long-acuminate; pedicel of capsule 5—6 c. m. long; lid mamillate; stem distinct; tufts more dense, about 2 c. m. high; spores somewhat larger. — *Eur.* Norway near Tromsoe: Kaurin, com. N. Bryhn.

* **B.subinclinatum** Kindb. n. subsp.

Spores smaller about 0,02 m. m. Endostome adhering to teeth; lid apiculate. Tufts very dense and tomentose. — *Amer.* Can. northern Labrador: Macoun 1896.

160.**B.Hagenii** Limpricht.

Differs from *B. inclinatum*: Leaves longer, often denticulate above; the lower on shoots (barren stems) short-decurrent. Lid of capsule low; spores larger. Tufts higher. — Rocks r. *Eur.* Norway: I. Hagen.

* **B.curvatum** Kaurin et Arnell.

Capsule and its neck sometimes curved or oblique. — *Eur.* r. Norway: Arnell.

161.**B.Froudei** Kindb. in Ottawa Naturalist V.

Leaves ovate-lanceolate, twisted when dry: the uppermost not glomerate; upper cells very long and narrow; costa long-excurrent. Capsule oblong-obovate; lid flat mamillate or subapiculate; pedicel about 3 c. m., not much longer than tufts. Spores scarcely 0,03 m. m. Stem distinct and tomentose with longish shoots. — *Amer.* r. Alaska: J. M. Macoun. Can.: J. Macoun.

7. Rutilantiformia.

162.**B.rutilans** Bridel. — B. oeneum Blytt.

Leaves ovate-lanceolate long-acuminate, broadly limbate and reflexed, gen. entire, twisted when dry, finally copper-red; costa short-excurrent. Capsule brown. Stem us. high, often with filiform propagula. Tufts dense tomentose, often zonate when dry. Us. dioecious, r. fruiting. — Wet rocks in northern alps r. *Eur.* Norway in Dovrefjeld!; R. Hartman. *Amer.* Greenl.: Berggren.

163.**B.campylocarpum** Limpricht. — »B. angustifolium Kaurin» (not Bridel) ?

Differs from the last: Leaves denticulate above, not or indistinctly reflexed, less twisted when dry; costa subpercurrent. Capsule sometimes shorter necked; lid more deplanate. Stem lower, less radiculose. Monoecious. — Wet rocks by rivulets in northern alps r. *Eur.* Norway!

V. Webera Hedwig; Schimper.

1. Crudiformia.

A. Leaves serrate not reflexed us. crowded; costa not percurrent. Capsule subclavate; cilia us. long.

a. Leaves short opal-glossy. Capsule gen. cernuous.

164.**B.crudum** L. — Mnium L.; Bryum Hudson.

Leaves suboblong short-acuminate: comal and perichetial longer acuminate. Capsule not constricted. Perigonial leaves patent. Tufts us. loose. Synoecious or paroecious but often also with discoid male flowers. — Earth and rocks common. *Eur.* Sweden, Norway, Switzerl.! *Amer.* Can.: J. Macoun. Alaska: J. M. Macoun.

b. Leaves long not opal-glossy. Capsule gen. suberect.

165.**B.nitescens** Kindb. in botan. notiser 1896. — Bryum (Webera) nitens Kindb. Laubm. S. u. N.; non Hooker.

Leaves oblong-lanceolate acuminate: perichetial long. Capsule not constricted; cilia long. Perigonial leaves erect. Tufts dense tomentose silky or golden glossy. Dioecious with gemmiform male flowers, r. synoecious. — Alpine and arctic districts r. *Eur.* Norway in Dovrefjeld! Sweden: A. Grape. *Amer.* Greenl.: Vanhoeffen. Can. northern Labrador: Macoun.

166.**B.longicollum** Swartz. — Webera Hedwig.

Leaves narrowly ovate-lanceolate long-acuminate: perichetial shorter than uppermost stem-leaves. Capsule faintly constricted, narrower than in the last; cilia sometimes short. Tufts sparingly radiculose silky or golden glossy. Paroecious without special male flowers. — Schistose and siliceous alp. rocks r. *Eur.* Norway! Switzerl.: Schimper. Austria: Venturi. *Amer.* »Cascade mts»: Lesq. et J.

167. **B. Bolænderi** Lesquereux.

Differs from the last: Leaves loosely disposed more patent. Capsule thicker more inclined. Tufts looser. Paroecious or dioecious. — *Amer.* r. Can.: Macoun.

168. **B. longibracteatum** Brotherus. — Pohlia Broth.; Bryum Kindb.

Leaves linear-lanceolate short-acuminate distant long-decurrent. Male flowers discoid; perigonial leaves long linear-lanceolate. Tufts loose glaucous green. Capsules unknown. Dioecious. — *Amer.* r. U. S. Oregon: Roell.

B. Upper leaves faintly serrate reflexed nearly all around; costa subpercurrent or short-excurrent. Capsule suboblong; cilia rudimentary.

169. **B. crassidens** Lindberg. — Pohlia Lindb.; Bryum Kindb.

Lower leaves small ovate apiculate not reflexed, distant, finally red; upper sublinear-lanceolate acuminate green silky glossy. Capsule often suberect. Tufts often dense. Male plants less radiculose; leaves gradually larger upwards; flowers discoid. Dioecious. — Alp. rocks r. *Eur.* Norway: N. Bryhn. Sweden: E. Nyman.

2. Nutantiformia.

A. Sterile stems us. with bud-like propagula. Leaves loosely disposed, only the uppermost glomerate; cells somewhat dilated. Dioecious r. fruiting. Stems not or loosely tufted.

170. **B. annotinum** Hedwig. — Webera Bruch.

Capsule suboblong red-yellow; teeth yellow; pedicel pale red Uppermost leaves narrowly ovate-lanceolate or sublinear-subulate, sometimes decurrent; lower subovate-oblong not decurrent, not appressed when dry. Bulbilli us. red. — Sandy or clayey soil. *Eur.* not common. Sweden, Norway! *Amer.* r. Greenl.: Berggren. Can.: Macoun.

171. **B. proligerum** Lindberg. — Pohlia Lindb.; Bryum Kindb.

Capsule broad-oval dark brown-red; teeth brown-yellow; pedicel purplish. Leaves broader than in the last, more erect when dry. Bulbilli us. greenish. — Sand or clay. *Eur.* probably not r. Switzerl., Sweden! Norway!; S. O. Lindberg and E. Nyman.

B. Stem without bulbilli. Leaves crowded, at least the upper of fertile stems; cells narrow. Tufts us. dense.

a. Upper leaves serrate. Us. paroecious. Capsule with apiculate lid.

172.**B.nutans** Schreber. — Webera Hedwig.

Leaves ovate-lanceolate acuminate acute: upper narrower, faintly reflexed; costa r. subexcurrent. Capsule oval-oblong us. brown-red sometimes bicolored; cilia r. appendiculate. — Earth, rocks and swamps common. *Eur.* Sweden etc.! *Amer.* Can.: Macoun; Waghorne. U. S.: Roell.

* **B.cuspidulatum** Kindb. n. subsp

Perichetial leaves long-subulate gen. not reflexed; costa gen. long-excurrent. Stem very short. Dioecious. — Alps r. *Eur.* Norway!

* **B.canaliculatum** C. M. et Kindb. — Webera cat. Can. m.

Perichetial leaves with thicker, canaliculate sometimes excurrent costa. Cilia long-appendiculate. Lowest leaves short-decurrent. Spores larger. — Wet earth r. *Amer.* Can. Vanc. isl.: Macoun.

* **B.camptotrachelum** Renauld et Cardot.

Leaves erect but much longer than in *B. annotinum*; perichetial gen. with excurrent costa. Capsule sometimes with curved neck. Stem very short. Dioecious. — *Amer.* r. »U. S.»: Cardot.

* **B.Macounii** Kindb. n. subsp.

All leaves, also on sterile stems and shoots, distinctly serrate, not glossy, finally red, densely crowded, appressed when dry. — Rocks r. *Amer.* Can. Vanc. isl.: J. Macoun.

b. Leaves nearly entire. Dioecious or polygamous with subdiscoid male flowers. Capsule with mamillate lid.

173.**B.Schimperi** C. Mueller.

Capsule brownish narrow; teeth pale. Leaves reflexed. Tufts often high and purplish. — Alp. swamps r. *Eur.* Scotl.: herb. Milde. *Amer.* Can. northern Labrador: Macoun. »Greenl.»: Berggren.

174.**B.Sphagni** »Bridel»: C. Mueller. — B. sphagnicola Br. eur.

Capsule pale brown; teeth yellowish; pedicel yellowish often very long. Leaves not reflexed, gen. distant. Stems r. tufted. — Turf-moors r. *Eur.* Sweden, Norway! Germany: Geheeb. *Amer.* Can: Macoun.

3. Pulchelliformia.

A. Capsule strangulate; teeth brown-red; annulus none. Leaves crowded; cells wide, the upper subrhombic.

175.**B.carneum** L. — Webera Schimper; Mniobryum Limpricht.

Leaves broadly ovate-lanceolate or ovate-oblong short-acuminate not decurrent; costa red not percurrent. Capsule broad oval red-yellow or finally brown-red. Tufts green. — On earth. *Eur.* not common. Switzerl.! Sweden: M. Huss. France; Le Jolis. *Amer.* r. Can.: Macoun.

B. Capsule not strangulate; teeth yellow; annulus us. present. Leaves more or less distant; cells narrow or not much dilated.

a. Shoot-leaves and lower leaves of fruiting stem distant narrowly long-decurrent. Leaves finally red. Tufts dense.

176.**B.columbicum** Kindb. — Webera cat. Can. m.

Leaves sublinear-lanceolate long-acuminate serrate reflexed; cells narrow; costa red subpercurrent. Capsule red or red-yellow broad-oval or subglobose; annulus broad; cilia in pairs. — Moist banks r. *Amer.* Can.: Macoun.

b. Leaves not distinctly decurrent us. green. Tufts us. loose.

aa. Capsule more or less distinctly annulate.

177.**B.pulchellum** Hedwig. — Webera Schimper, in part.

Capsule subglobose or oval red-yellow or finally brown-red; neck shortish. Leaves ovate-lanceolate acuminate: upper denticulate faintly reflexed; cells narrow; costa green not excurrent. — Earth in northern distr. *Eur.* Norway!; E. Nyman. Finl.: Brotherus. Sweden not r.: P. Olsson. *Amer.* r. Can.: Macoun.

178.**B.lutescens** Limpricht. — Webera Limpr.; Bryum Kindb.

Differs from the last: Capsule suboval paler; neck us. longish. Leaves more distinctly serrate and distant; costa red, in comal leaves sometimes excurrent. Tufts less loose. — Earth also in alps r. *Eur.* Norway!

179.**B.Lescurii** Sullivant ic. musc. — Webera Lesq. et Jam.

Differs from *B. pulchellum*: Annulus broader, wholly revoluble. Leaves longer: lower less distant, upper more subulate not reflexed; cells wider. — Wet clay soil r. *Amer.* Can.: Macoun. U. S.: Sullivant and Austin, com. Mrs Britton.

bb. Capsule not annulate.

180.**B.Drummondii** C. Mueller. — Mniobryum vexans Limpr.

Capsule sometimes larger than in *B. pulchellum*. Differs also from it: Leaves erect distinctly reflexed and serrate; cells wider; costa finally red below. — Earth also in alps r. *Eur.* »Germany»: Limpricht. *Amer.* Can.: Drummond n. 261, com. Macoun.

4. Cucullatiformia.

A. Leaves very distant, us. broadly long-decurrent; cells gen. very wide.

181.**B.Ludwigii** Sprengel. — Webera Breidleri Juratzka.

Leaves gen. ovate or suboblong obtusate, us. entire and large. Capsule suboval. Tufts loose finally red. Dioecious. — Wet siliceous ground princ. in alps. *Eur.* less r. Norway! Austria: Breidler. *Amer.* r. Can. Brit. Col.: Macoun. U. S.: Henderson, com. Cardot.

* **B.grande** Kindb. n. subsp. — Webera Ludwigii var. latifolia Schimp.

Leaves still larger and broader, round-ovate gen. quite entire and green, less distinctly decurrent; cells rhombic wider. Stem very high. Capsules unknown. — Alp. region r. *Eur.* Norway!

182.**B.Bigelowii** Sullivant. — Webera Ludwigii var. microphylla Kindb. cat. Canad. m.

Differs from *W. Ludwigii*: Leaves small; cells narrower; costa shorter. — Wet alp. rocks r. *Amer.* Can. Brit. Col.: Macoun.

B. Leaves crowded or not much distant, not or shortly decurrent; cells rhomboidal not much wide.

a. Paroecious. Leaves obtusate gen. obtuse, at least the lower and the perichetial.

183.**B.cucullatum** Schwægrichen. — Webera Schimper.

Leaves oval-ovate not decurrent. Capsule oval-oblong yellowish brown; lid mamillate; cilia smooth; endostomial membrane very low. Tufts dense. — Moist alp. places. *Eur.* less r. Norway!; E. Nyman. Austria: Breidler. *Amer.* r. Greenl.: Berggren. Can.: Gremann, com. Cardot. U. S.: Henderson, com. Cardot.

184.**B.cucullatiforme** Kindb. n. sp.

Differs from the last: Leaves subdecurrent smaller, appressed when dry: upper gen. acute. Capsule smaller and more constricted; cilia sometimes appendiculate. — Arctic distr. r. *Amer.* Alaska: J. M. Macoun.

b. Dioecious. Leaves acute, at least the perichetial.

aa. Leaves crowded not decurrent. Endostomial membrane very low; cilia short rudimentary; lid mamillate.

185.**B.polymorphoides** Kindb. — Webera cat. Canad. m.

Leaves ovate-oblong acute or subobtuse; costa not excurrent, in the longer and narrower perichetial sometimes excurrent. Capsule oblong yellowish brown; teeth pale; pedicel about 2 c. m. long. Tufts dense 4—5 c. m. high rufescent below. — Higher alp. region r. *Amer.* Can. Brit. Col. 2250 metr. a. sea: J. M. Macoun.

bb. Leaves more or less distant and decurrent. Endostomial membrane elevate; cilia long; lid conic.

186.**B.commutatum** Schimper. — Webera Sch.; Bryum Boulay.

Leaves oval-ovate or suboblong us. short-acuminate and erect when dry. Perichetial leaves oblong-lanceolate more distinctly denticulate. Capsule suboval dark or blackish brown. — On earth in alps. *Eur.* not uncommon. Norway! Finl.: Brotherus. France: Husnot. *Amer.* Greenl.: Berggren. Can.: Macoun.

* **B.microdontium** Kindb. — Webera microdenticulata C. M. et Kindb. cat. Can. m.

Leaves more glossy, patent when dry: perichetial somewhat longer. Tufts looser. — Higher alp. region r. *Amer.* Can. Brit. Col. 2100 metr. a. sea: Macoun.

* **B.gracile** Schleicher. — Webera Notaris.

Leaves smaller narrower more acuminate, appressed when dry. Capsule narrower sometimes reddish. Stem often with us. red bulbilli. — Alps r. *Eur.* Norway, Switzerl.! Austria: Venturi. *Amer.* Can.: Macoun.

* **B.subcucullatum** C. M. et Kindb. — Webera cat. Can. m.

Leaves small suboblong gen. obtusate, appressed when dry: lower obtuse. Capsule smaller. Stem without bulbilli. Tufts dense. — Higher alp. region r. *Amer.* Can. 2100 metr. a. sea: Macoun.

* **B.Cardoti** Renauld. — Webera Ren.; Bryum Kindb.

Lower leaves often subobtuse. Capsule sometimes erect when moist, sometimes pendent when dry. — *Amer.* r. U. S. Oregon: Henderson, com. Cardot.

* **B.filum** Schimper.

Leaves not reflexed, often subobtuse, more distant or less distinctly crowded; cells wider. Tufts high often loose. Capsules unknown. — Alps r. *Eur.* Norway! Switzerl.: Culmann, com. Husnot.

* **B.carinatum** Boulay. — »Webera cucullata var.»: Husnot.

Leaves carinate not reflexed nearly appressed, very glossy. Capsule thick; pedicel short. — Rocks r. *Eur.* Mont Blanc: Payot, com. Husnot.

* **B.Payoti** Schimper. — »Bryum Blindii var.»: Husnot.

»Leaves broad-ovate long-decurrent nearly entire, imbricate when dry. Tufts 4—6 c. m. high not tomentose. Capsules unknown. — Alp. rivulets r. *Eur.* France: Payot»: Limpricht.

187.**B.microsporum** Kindb. — Webera pycnodecurrens C. M. et Kindb. cat. Can. m.

Differs from *B. commutatum*: Leaves distinctly serrate longer-decurrent, more glossy and finally reddish, patent when dry;

cells narrower. Capsule reddish yellow; cilia sometimes subappendiculate. Spores very small. — Alps r. *Amer.* Brit. Col. 2100 metr. a. sea: Macoun.

188.**B.canadense** Kindb. — Webera micro-apiculata C. M. et Kindb. cat. Can. m.

Leaves small suboblong or oblong-lanceolate apiculate or narrowed to a short gen. entire acumen, finally red, appressed when dry; the uppermost denticulate faintly reflexed; cells very narrow; costa faint, vanishing far below apex. Tufts dense not high, green above, reddish below. Capsules unknown. — Rocks r. *Amer.* Can. Brit. Col.: Macoun.

189.**B.norvegicum** Kindb. — B. micro-commutatum Kindb. botan. notiser 1896.

Leaves small oval-ovate obtusate or short-acuminate faintly denticulate nearly crowded and gen. not decurrent; cells not wide; costa not excurrent. Tufts low green. Differs from *B. commutatum*: Capsule subglobose or broad-piriform purplish or finally dark brown-red, often erect; neck very short; teeth brown-yellow; pedicel us. shortish. — In alp. region r. *Eur.* Norway Dovrefjeld and Tronfjeld!

5. Albicantiformia.

190.**B.albicans** Wahlenberg. — Mniobryum Limpr.

Leaves not glossy, often glaucous green sometimes finally red; cells rhomboidal; costa not percurrent. Lower leaves ovate or ovate-oblong; upper acute not reflexed, distant short-decurrent, us. narrowly ovate-lanceolate. Capsule glaucous finally reddish or orange-brown, blackish when old, thick piriform; neck thick; teeth orange; lid mamillate; pedicel long. Tufts loose often high when sterile, about 2—3 c. m. when fruiting. Dioecious. — Wet places princ. in alps. *Eur.* common in alps. Sweden, Norway, Switzerl.! *Amer.* Can.: J. Macoun; Moser. Alaska: J. M. Macoun. U. S.: Henderson, com. Cardot.

* **B.sparsum** »Hampe»: C. Mueller.

Leaves smaller; cells narrower. Stem short. — *Amer.* r. U. S.: Roell; Bolænder, com. C. Mueller.

VI. Epipterygium Lindberg.

191.**B.Tozeri** Greville. — Webera Schimper.

Leaves pale green; the larger oval or obovate abruptly short-acuminate acute decurrent; inner cells wide rhomboidal. Smaller leaves oblong. Capsule small obovate rufescent; neck short; lid conic; annulus very broad; pedicel not long. Stems short not tufted. Dioecious. Habit of *B. carneum.* — Wet earth r.

Eur. France: Philibert; Du Noday. Engl.: Curnow. *Amer.* Pacif. distr. Can.: Macoun. U. S.: Henderson. com. Cardot.

VII. Pohlia Hedwig, in part.

A. Capsule large narrowly oblong. Upper leaves narrowly ovate-lanceolate distinctly reflexed. Tufts loose.

192.**B.elongatum** Hedwig. — Pohlia H.; Bryum Dickson.

Upper leaves sharply acuminate more or less denticulate. Capsule not pendent, with us. curved longer neck; lid r. rostellate; pedicel long. Us. paroecious. — Earth and rocks princ. below alp. regions. *Eur.* not r. Norway! Sweden: E. Adlerz.

* **B.ambiguum** Limpricht. — Webera Limpr.; Bryum Kindb.

»Leaves denticulate only near apex: upper suddenly larger. Cilia split. — *Eur.* r. Austria»: Limpricht.

* **B.acuminatum** Hornschuch. — Pohlia Hsch.; Bryum Br. eur.

Leaves denticulate near apex: upper often suddenly larger. Capsule not shorter than the us. straight neck; lid often rostellate. — Earth and rocks princ. in alps. *Eur.* Norway, Switzerl.! Sweden: H. Nordenstrœm. Scotl. Rogers. *Amer.* Can.: Macoun; Fowler.

B. Capsule not large, suboblong or subobovate. Upper leaves faintly reflexed, broadly ovate-lanceolate. Tufts dense.

193.**B.polymorphum** Hoppe et Hornschuch. — Pohlia Hop. et Hsch.; Bryum Br. eur.

Capsule gen. suboblong and pendent; neck shorter, r. curved; lid not rostellate; pedicel us. short. Leaves crowded us. appressed when dry; cells very narrow. Stem us. naked below or beset with very small leaves. Tufts low. Us. paroecious. — Earth and rocks in alp. regions. *Eur.* not r. Norway, Switzerl.! France: Husnot. *Amer.* r. Greenl.: Berggren; Vanhoeffen.

* **B.brachycarpum** Hoppe et Hornschuch. — Pohlia Hop. et Hsch.; Bryum Kindb.; B. nudicaule Lesquereux; Sullivant icon. m.; Webera microcaulon C. M. et Kindb. cat. Can. m.

Capsule thick subobovate. Us. monoecious. — Alp. rocks r. *Eur.* Norway! France: Husnot. *Amer.* Can.: J. Macoun. Alaska: J. M. Macoun. U. S.: Bolænder, com. C. Mueller.

* **B.pseud-acuminatum** Kindb. n. subsp.

Capsule larger, suboblong and gen. not pendent. Stem and pedicel longer. Us. monoecious or dioecious. — Alp. rocks r. *Eur.* Norway!

194.**B.subpolymorphum** Kindb. n. sp.

Capsule oblong pendent, smaller than in *B. polymorphum*;

neck shorter; lid rostellate. Leaves less crowded and not appressed when dry, sometimes subdecurrent; cells wider. Stem uniformly foliate, not naked below. Dioecious. — Alp. regions r. *Amer.* Can. Brit. Col. 1950 metr. a. sea: Macoun Canad. musci n. 468.

156. **Leptotheca** Schwægrichen.

1.**L.Wrightii** Sullivant.

»Comal leaves oblong-obovate or obovate-spathulate, narrowly margined, recurved, serrulate above; costa excurrent. Capsule erect cylindric; endostome rudimentary. Tufts low dense tomentose. Pseudo-monoecious. — *Amer.* r. U. S. Florida»: Lesq. et Jam.

Fam. 33. **Buxbaumiaceæ.**

157. **Buxbaumia** Haller; L.

1.**B.aphylla** L.

Capsule brown, depressed on upper side with thick border and persistent cuticle; teeth short in a single row. — Bare earth esp. in fir-woods or on decayed wood. *Eur.* not r. Sweden! Austria: Schmidt. France: Brébisson. *Amer.* r. Can.: Macoun.

2.**B.indusiata** Bridel.

Capsule green neither depressed nor margined; cuticle splitting; teeth in 4 rows, each row increasing in length. — Rotten logs. *Eur.* not r. Sweden! France: Husnot. *Amer.* r. Can.: Macoun.

158. **Diphyscium** Ehrhart; Mohr.

1.**D.sessile** Schmid. — Buxbaumia Schmid; Diphyscium Lindb.; D. foliosum Mohr.

Leaves small linear-lingulate, curled when dry; upper cells rotundate, lower oval-oblong, outer basal linear pellucid; costa not percurrent. Perichetial leaves very large not chlorophyllose, from ovate-oblong base long-acuminate ciliate near apex; costa excurrent to a long rough hairpoint. Capsule large ovoid small-mouthed often curved; endostome white. Dioecious. — Earth and rocks. *Eur.* not r. Switzerl.! *Amer.* Can.: Macoun.

Fam. 34. **Andreæaceæ.**

159. **Andreæa** Ehrhart.

A. Leaves nerveless us. appressed when dry.

1. **Petrophilæ.** Leaves more or less papillose. Us. monoecious.

B. Leaves costate, not appressed when dry, often falcate.

2. **Nivales.** Leaves papillose, crisped or flexuous when dry; the perichetial costate. Dioecious, r. fruiting.

3. **Rupestres.** Leaves smooth or (sometimes in *A. frigida*) faintly mamillose, not crisped: inner perichetial convolute and (exc. *A. Rothii*) nerveless. Monoecious.

1. Petrophilæ.

A. Leaves broader above base, somewhat large; perichetial obtusate. Stem often longish.

a. Leaves slightly crenulate at base; cells small.

1.**A.alpina** L. — Jungermania L.; Andreæa Smith.

Leaves short-acuminate obtuse crowded nearly smooth, us. appressed when dry. Tufts blackish; stem erect not much high. — Rocks near Atlantic sea r. *Eur.* Norway! R. Hartman; F. Kiær.

b. Leaves entire; cells somewhat large.

2.**A.Hartmani** Schimper.

Leaves large gen. obtusate and distant, nearly smooth and not appressed. Tufts brownish. Stem us. very long and floating. — Stones in rivulets in northern alps r. *Eur.* Norway! Sweden: K. F. Thedenius.

* **A.Thedenii** Schimper.

Leaves less large and more distinctly acuminate, crowded, faintly papillose, often appressed. Tufts blackish brown; stem erect not much high. — Wet rocks in norther alps r. *Eur.* Norway!

3.**A.obovata** Thedenius.

Leaves less large gen. long-acuminate, crowded, distinctly papillose and appressed, reddish or brown-red when moist. Tufts blackish when dry; stem erect not much high. — Wet rocks in northern alps r. *Eur.* Norway! Sweden: R. Hartman. Finl.: Brotherus. *Amer.* Greenl.: Berggren.

B. Leaves broader near base, gen. small and appressed when dry; perichetial sometimes acuminate. Tufts loose; stem erect.

4.**A.petrophila** Ehrhart.

Leaves ovate oblong or ovate-lanceolate acuminate gen. subobtuse distinctly papillose and crowded: inner perichetial us. obtusate. Tufts gen. brown and low. — Siliceous rocks common. *Eur.* Sweden, Norway, Switzerl.! Spain: Levier. *Amer.* Can.: Macoun; Waghorne.

* **A.alpestris** Thedenius.

Leaves smaller and less papillose, short-acuminate obtuse; cells smaller. Perichetial leaves obtusate obtuse. Stem thinner. Tufts us. blackish. — Northern alps r. *Eur.* Norway! *Amer.* Can.: Macoun.

* **A.papillosa** Lindberg.

Leaves very papillose often nearly subulate-acuminate; cells somewhat large. Perichetial leaves acute short-acuminate. Tufts often high and blackish. — Princ. in arctic distr. r. *Eur.* Norway! Spetsbergen: Berggren. *Amer.* »Greenl.»: Lange:

* **A.subsparsifolia** Kindb. n. subsp.

Leaves gen. long-acuminate: perichetial acute acuminate; cells not large. Tufts brown somewhat high. — *Eur.* r. Norway on rocks near Atlantic sea in Oerkedal!

* **A.tenella** Kindb. n. subsp.

Leaves narrow long-acuminate often crenulate above, very small; cells small as in *A. alpestris.* Stem capillary. Tufts low blackish. — Alp. region r. *Eur.* Spain hospice de Vénasque in Pyren. mts 1800 metr. a. sea!

* **A.sparsifolia** Zetterstedt.

Leaves distant gen. long-acuminate acute, also the perichetial. Tufts sometimes olive-green, often somewhat high. — In alps r. *Eur.* Norway: Bryhn. Sweden: E. Nyman.

* **A.sublævis** Kindb. note on Can. bryol. 1893 (as var.).

Leaves small distant spreading gen. nearly smooth: perichetial gen. acute long-acuminate. Tufts low blackish brown. — *Amer.* r. Can. Vanc. isl.: J. M. Macoun.

5.**A.parvifolia** C. Mueller in Flora 1887.

»Plant very small. Leaves minute from oval biventricose base narrowed to a suboblong round-obtuse acumen, very papillose: perichetial subobtusate or acuminate. Capsule minute; pedicel very short. Dioecious. — Arctic distr. r. *Amer.* Alaska»: C. M.

2. Nivales.

A. Leaves papillose on whole lamina, not densely crowded, more or less crisped. Tufts loose and high when sterile.

6.**A.nivalis** Hooker.

Leaves ovate-lanceolate gradually narrowed to the subulate acumen, papillose princ. at borders; costa not or slightly excurrent. Tufts us. blackish or black-red when dry. — Wet sand on alp. often inundated rocks r. *Eur.* Norway! Sweden: E. Adlerz. France: Zetterstedt. Austria: Husnot m. Gall.

7.**A.Macounii** Kindb. bull. Torr. club 1890.

Leaves from short ovate or broadly ovate-lanceolate base abruptly narrowed to the sublinear acumen, papillose princ. on upper part of costa, whick is purple red gen. long-excurrent but not filling whole acumen below. Tufts brown or brown-red when dry. Capsules unknown. — On inclined faces of rocks by rivulets in higher alp. region r. *Amer.* Can. Brit. Col. 2250 metr. a. sea: J. Macoun. U. S. Oregon: Roell.

B. Leaves smooth on lamina, papillose on the long-excurrent costa, crowded, slightly crisped. Tufts low dense.

8.**A.Blyttii** Schimper.

Leaves from short ovate base abruptly narrowed to the excurrent costa. Tufts us. blackish when dry. — Northern alps r. *Eur.* Norway: M. N. Blytt; Zetterstedt. *Amer.* Greenl.: Berggren, com. Nathorst.

3. Rupestres.

A. Leaves with not or slightly excurrent costa; the inner perichetial with percurrent costa.

9.**A.Rothii** Weber et Mohr.

Leaves crowded us. ovate-lanceolate broadly acuminate subacute and not falcate. Tufts low dense blackish or red-brown. — Siliceous rocks. *Eur.* not r. Norway! Sweden!; R. Hartman. France: Husnot. *Amer.* r. »U. S.»: Lesq. et Jam.

* **A.falcata** Schimper.

Leaves falcate smaller, from ovate-oblong base abruptly narrowed to the subulate acumen. Tufts us. blackish. — Alp. rocks r. *Eur.* Spain, Switzerl.! France: Husnot. *Amer.* Can.: Macoun.

B. Leaves gen. with long-excurrent costa: inner perichetial nerveless.

a. Leaves short ovate or ovate-oblong crowded often suberect when dry: perichetial us. smooth.

10.**A.crassinervis** Bruch.

Leaves subovate; costa thick terete long-excurrent. Inner perichetial leaves long-acuminate, outer costate. Tufts dense blackish. — Rocks princ. below alps near sea. *Eur.* Sweden less r.!; M. Huss. Norway: E. Nyman. Finl.: Axel Arrhenius. *Amer.* r. N. Foundl.: Waghorne.

11.**A.obtusifolia** Berggren in sched.

Leaves ovate-oblong; costa faint applanate excurrent not filling whole acumen below. Nearly all perichetial leaves nerveless: inner obtusate or short-acuminate. Tufts loose blackish.

— Dry siliceous rocks in arctic distr. r. *Amer.* Greenl.: Berggren, com. Nathorst.

b. Leaves gen. ovate-lanceolate patent also when dry.

aa. Leaves somewhat distant: inner perichetial very papillose.

12.**A.Huntii** Limpricht.

Leaves falcate; costa not filling whole acumen below. Tufts dense blackish. — Rocks princ. in lower districts r. *Eur.* Sweden: C. Indebetou. Norway: E. Nyman. Engl.: Holt. Portugal: Levier. *Amer.* Can. Vanc. isl.: Macoun.

bb. Leaves crowded; the perichetial smooth.

13.**A.frigida** Huebener.

Leaves broadly acuminate subobtuse; outer perichetial costate. Tufts dense reddish brown or blackish. — Siliceous alp. rocks. *Eur.* not r. Spain! Portugal and Corsica: Levier. Germany: Limpricht. Austria: Breidler.

14.**A.angustata** Lindberg.

Leaves narrowly long-acuminate subacute: perichetial nerveless. Tufts loose blackish very low. — In alp. region r. *Eur.* »Austria 1600 metr. a. sea: Breidler»: Limpricht.

Fam. 35. Bruchiaceæ.

160. Bruchia Schwægrichen.

A. Calyptra hispid. Capsule with nearly indistinct neck.

I. **Trachymitra.** Capsule wholly immersed; pedicel very short. Upper leaves long-acuminate subovate-lanceolate; costa percurrent. Spores nearly smooth about 0,03 m. m. Monoecious.

B. Calyptra glabrous. Capsule gen. distinctly necked.

II. **Pseudo-Trematodon.** Capsule with narrow often defluent neck; pedicel gen. long-exserted above the upper leaves. Spores about 0,02 m. m., more or less papillose. Us. monoecious.

III. **Eu-Bruchia.** Capsule with gen. thick (not defluent) and not longer neck; pedicel short-exserted or immersed. Paroecious or (*B. Drummondii*) monoecious, r. dioecious.

I. Trachymitra Kindb.

1.**B.Ravenelii** Wilson; Sullivant icon. musc.

Upper leaves nearly gradually acuminate; costa nearly filling upper part of the serrulate acumen. — *Amer.* r. »U. S.»: Sullivant.

2.**B.Carolinæ** Austin; Britton in contrib. from Columbia coll.

Upper leaves gen. from subobovate base abruptly acuminate; costa broadly bordered by lamina of the nearly entire acumen. — *Amer.* r. »U. S.: Austin»: Britton.

II. Pseudo-Trematodon Kindb.

A. Upper leaves slightly sinuolate above; costa not excurrent.

3.**B.Bolænderi** Lesquereux; Sullivant icon. m.

Upper leaves ovate-lanceolate nearly gradually narrowed. Capsule shorter than the not defluent neck; pedicel longer. — *Amer.* r. »U. S.»: Sullivant.

B. Upper leaves us. entire r. denticulate; costa excurrent.

4.**B.longicollis** Eaton bull. Torr. club 1890.

Upper leaves ovate-lanceolate nearly gradually narrowed; costa filling upper half of acumen. Capsule shorter than the defluent neck; pedicel long-exserted. — *Amer.* r. »U. S.»: Eaton.

5.**B.trobasiana** Notaris.

Upper leaves subovate-lanceolate gradually narrowed, costa not filling whole acumen below. Capsule not shorter than the subdefluent neck; pedicel scarcely exserted above upper leaves. Sometimes paroecious. — *Eur.* r. Austria: Breidler, com. Warnstorf.

6.**B.vogesiaca** Schwægrichen.

Upper leaves ovate-oblong abruptly narrowed to a by costa filled acumen. Capsule not shorter than the defluent neck; pedicel long-exserted. — *Eur.* r. France: Boulay; Buchinger.

III. Eu-Bruchia.

A. Costa of leaves excurrent.

7.**B.curviseta** Lesquereux et James.

»Upper leaves subovate, denticulate above. Capsule wholly exserted, longer than the thick neck; pedicel curved or geniculate, not shorter. Spores papillose. Paroecious. — *Amer.* U. S.»: Lesq. et Jam.

8.**B.Drummondii** Hampe. — B. brevipes Sull. l. c. (non Hooker).

Upper leaves entire from subovate base abruptly narrowed to the subulate by costa nearly wholly filled acumen. Capsule wholly immersed; pedicel short. Spores less papillose. Monoecious. — *Amer.* r. »U. S.»: Sullivant.

B. Costa of leaves not excurrent.

a. Leaves short obtusate or short-acuminate.

9.**B.brevifolia** Sullivant icon. musc.

Upper leaves from longer, ovate-oblong base nearly gradually narrowed to the short acumen; costa percurrent. Capsule partly emergent; pedicel very short. Spores nearly smooth somewhat small. — *Amer.* r. »U. S.»: Sullivant.

10.**B.fusca** Britton l. c.

Upper leaves ovate or broad-ovate obtusate or very short-acuminate, often obtuse; costa abbreviate or scarcely percurrent. Capsule exserted; pedicel nearly immersed. Spores as in the last. — *Amer.* r. »U. S.»: Mrs Britton.

11.**B.Hallii** Austin; Britton l. c.

Upper leaves subovate very short-acuminate acute; costa percurrent. Capsule wholly exserted; pedicel nearly emergent at apex. Spores large papillose. — *Amer.* r. »U. S.»: Mrs E. G. Britton.

b. Leaves long-acuminate. Spores somewhat large, us. very papillose.

12.**B.texana** Austin; Britton l. c. — B. flexuosa var. nigricans Sull. l. c.

Upper leaves from ovate-oblong base abruptly subulate-acuminate, entire. Capsule wholly exserted, longer than the thick neck; pedicel subemergent. — *Amer.* U. S.: com. Macoun.

* **B.Donnellii** Austin; Lesq. et Jam.

»Leaves sinuolate above, sometimes faintly papillose. Pedicel often emergent. — *Amer.* r. U. S.»: Lesq. et Jam.

* **B.Sullivantii** Austin; Lesq. et Jam. — B. flexuosa Sull. l. c. in part.

Capsule partly emergent. Spores larger, more papillose. — *Amer.* r. »U. S.»: Sullivant.

13.**B.flexuosa** Schwægrichen. — Phascum Schw.; Bruchia C. M.; B. Beyrichiana Sull. l. c.

Upper leaves from ovate-oblong base nearly gradually narrowed to the linear- subulate by the (not excurrent) costa nearly filled acumen. Capsule oval piriform without distinct neck, partly emergent; pedicel not shorter. — *Amer.* r. U. S.: Langlois, com. Cardot.

161. **Pleuridium** Bridel.

A. Monoecious with gemmiform male flowers.

a. Branches julaceous. Leaves obtusate or short-acuminate; upper cells small rhomboidal.

1.**P.Sullivantii** Austin. — »P. nervosum» Sull. icon. m., non Brid.

Leaves subovate crowded: upper with thick excurrent costa, perichetial abruptly acuminate much larger. Capsule broad-oval thick-pointed; pedicel nearly half as long. — *Amer.* r. »U. S.»: Sullivant.

b. Branches not julaceous. Leaves long-acuminate; the upper larger; cells rectangular.

2.**P.alternifolium** Dickson. — Phascum Dicks.; Pleuridium Rabenhorst.

Upper leaves somewhat abruptly subulate gen. serrulate above; costa sometimes excurrent. Capsule subovoid with straight point. Tufts green. — *Eur.* not r. in northern distr. Sweden! France: Lamy. Finl.: Bomansson. *Amer.* U. S.: Howe; Sullivant, com. C. Mueller.

3.**P.Bolænderi** C. Mueller.

Upper leaves gradually subulate nearly entire, shorter than in the last; costa excurrent. Capsule ovoid with oblique point. Tufts dark green. — *Amer.* r. U. S. Chicago: Roell.

B. Paroecious or synoecious.

a. Upper leaves not larger than the lower.

4.**P.axillare** Dickson. — Phascum Dicks.; Pleuridium Lindb.; P. nitidum Rabenhorst.

Leaves narrowly ovate-lanceolate acute; costa faint not excurrent. Capsule ovoid often lateral. — *Eur.* not r. Sweden! Engl.: Rogers. Austria: Schmidt.

b. Upper leaves larger than the lower.

5.**P.palustre** Br. eur. — Phascum Br. eur.; Pleuridium Husnot.

Leaves crowded: upper ovate-oblong; costa long-excurrent. Calyptra mitriform. Capsule round-ovoid; pedicel very short. Protonema often persistent. — Wet earth. *Eur.* not common. Sweden: S. Berggren; J. Persson. Belgium: Gravet. *Amer.* »U. S.»: Lesq. et Jam.

6.**P.subulatum** Hudson. — Phascum Huds.; Pleuridium Rabenhorst.

Leaves gen. distant; the upper from ovate-oblong base nearly gradually subulate; costa not well-defined above and scarcely excurrent. Calyptra cucullate. Capsule ovoid apiculate; pedicel us. very short. Protonema not persistent. — Sandy soil. *Eur.* princ. in southern distr., r. in northern. Switzerl.! Sweden: M. Huss. Engl.: Whitehead. France: Husnot. *Amer.* »U. S.»: Lq. et J.

* **P.anomalum** Kindb. in nuovo giorn. bot. ital. 1893 (as var.).

Capsule with distinct lid; pedicel arcuate emergent above leaves. — On sand at a stonewall, mixed with *P. subulatum* and *Ditrichum pallidum* (hybride form ?). *Eur.* Switzerl. near Lugano!

* **P.astomoides** Limpricht.

»Hybride form ? Capsule without distinct lid, shorter than the straight not emergent pedicel. — Mixed with *P. subulatum* and *Ditrichum pallidum*. *Eur.* Austria: Breidler»: Limpricht.

7.**P.Ravenelii** Austin.

»Differs from *P. subulatum:* Upper leaves with longer sublanceolate base; costa excurrent. Capsule broadly apiculate, a little larger. — Light sandy soil r. *Amer.* U. S.»: Lesq. et Jam.

162. **Archidium** Bridel.

A. Monoecious with male flowers on separate branches. Leaf-cells subrectangular.

1.**A.ohioënse** Schimper; Sullivant icon. musc.

Leaves distant patent sublinear-subulate serrulate above; the perichetial from ovate base abruptly acuminate; costa gen. not excurrent. — Clay soil r. *Amer.* Can.: Macoun.

2.**A.Hallii** Austin.

Leaves crowded suberect sublinear-subulate nearly entire; costa sometimes excurrent. Perichetial leaves not seen. — *Amer.* r. U. S.: Henry, com. Cardot.

B. Synoecious or subparoecious (submonoecious).

3.**A.alternifolium** Hooker et Taylor. — Phascum H. T.; Archidium Schimper; A. phascoides Brid.

Leaves distant patent sublinear-subulate gen. entire; cells subrectangular; perichetial leaves from ovate-oblong base abruptly acuminate; costa sometimes excurrent. Stem with numerous flagelliform shoots. Habit of *Pleuridium alternifolium.* - Wet soil viz. near lakes r. *Eur.* Sweden: France: Berthoumieu.

4.**A.longifolium** Lesquereux et James.

»Synoecious. Leaves narrowly lanceolate-subulate; cells gen. rectangular; costa excurrent. — *Amer.* r. U. S.»: Lesq. et Jam.

5.**A.tenerrimum** Mitten.

»Differs from *B. ohioënse:* Subparoecious. Leaf-cells much shorter and closer. — *Amer.* r. U. S.: Drummond»: Lesq. et Jam.

6.**A.Ravenelii** Austin.

»Synoecious. Lower leaves ovate, upper ovate-lanceolate or acute or obtuse entire; cells round-oval or rhomboidal; costa sometimes excurrent. — *Amer.* r. U. S.»: Lesq. et Jam.

163. **Ephemerum** Hampe.

1. **Ecostata.** Leaves nerveless (r. faintly costate in upper half.).

2. **Costata.** Leaves costate. Spores papillose.

1. Ecostata.

A. Leaves serrate above middle; cells wide.

1.**E.serratum** Schreber. — Phascum Schr.; Ephemerum Hampe.

Leaves narrowly suboblong not long-acuminate. Spores papillose 0,05—0,07 m. m. — *Eur.* not r. Sweden: Hamnstrœm. Austria: Schmidt. France: Berthoumieu. *Amer.* »U. S.»: Lesq. et Jam.

* **E.præcox** Walther et Molendo. — E. intermedium Mitten.

Leaves faintly costate in upper half. — *Eur.* r. »Engl.»: Braithwaite.

2 **E.minutissimum** Lindberg.

Leaves narrowly lanceolate long-acuminate. Spores nearly smooth smaller than in the last. — *Eur.* r. »Engl.»: Braithwaite. *Amer.* Can.: Macoun; Drummond n. 10.

B. Leaves nearly entire; upper cells narrow.

3.**E.stellatum** Philibert.

Leaves from subovate base abruptly narrowed to a long subulate acumen. Spores smooth 0,04—0,05 m. m. — *Eur.* r. France: Philibert.

2. Costata.

A. Leaves from broader base gradually subulate.

a. Leaves nearly entire. Calyptra campanulate.

4.**E.sessile** Br. eur. — Phascum Br. eur.; Ephemerum C. M; E. stenophyllum Schimper; Braithwaite.

Leaves with long-excurrent costa; cells somewhat narrow nearly uniform. Capsule sessile; columella rudimentary. Spores 0,06—0,08 m. m. — *Eur.* r. France: Camus; Philibert. *Amer.* »U. S.»: Lesq. et Jam.

b. Leaves serrulate nearly all around. Calyptra subcucullate split at one side.

5.**E.crassinerve** Schwægrichen.

Leaves with smooth not excurrent costa; cells rectangular nearly uniform. Capsule very short-pedicellate; columella complete. — Described to figures in icones muscorum by Sullivant; his own description not is agreeing. — Moist clay ground. *Amer.* »U. S. common»: Lesq. et Jam.

6.**E.spinulosum** Bruch et Schimper.

»Differs from the last in leaves narrower; costa excurrent into a long hyaline spinulose arista. — *Amer.* Same locality as the preceeding»: Lesq. et Jam.

B. Leaves from long base abruptly narrowed to a shorter often deflexed acumen, more or less serrate above middle.

a. Calyptra cucullate. Costa of leaves excurrent.

7.**E.recurvifolium** Dickson. — Phascum Dicks.; Ephemerum Boulay; Ephemerella Schimper; E. pachycarpa C. M.

Leaves sublinear-lanceolate often somewhat long-acuminate, sometimes falcate when moist; cells subrectangular or the upper shorter. Spores about 0,04 m. m. — *Eur.* r. France: Brébisson.

b. Calyptra campanulate. Costa of leaves faint gen. not excurrent.

8.**E.cohærens** Hedwig. — Phascum Hedw.; Ephemerum Hampe.

Leaves suboblong short-acuminate; cells irregular: upper rhombic. Spores 0,05—0,07 m. m. — *Eur.* r. Austria: Breidler. *Amer.* »U. S. common»: Lesq. et Jam.

* **E.Flotowii** Funck. — Phascum Funck; Ephemerum Limpr.

»Leaves sublanceolate somewhat long-acuminate, often nearly entire. — *Eur.* r. Germany»: Schimper.

9 **E.Ruthei** Schimper; Husnot m. Gall.

Leaves sublinear-lanceolate long-acuminate; cells nearly uniform. Spores about 0,05 m. m. — *Eur.* r. »Germany»: Schimper.

164. **Nanomitrium** Lindberg.

1.**N.tenerum** Bruch. — Phascum Bruch; Nanomitrium Lindb.; Micromitrium megalosporum Austin; Sulliv. icon. m.; Ephemerum longifolium Philibert.

Leaves narrowly ovate-lanceolate faintly serrulate nearly all around, suberect when moist. Capsule with hyaline walls and very short subacute point, sometimes transversely splitting when pressed. Spores faintly papillose about 0,03 m. m. — *Eur.* r. France: Thériot; Philibert. *Amer.* »U. S.»: Sullivant.

2.**N.Austini** Sullivant. — Ephemerum Sulliv.; Nanomitrium Ren. et Card.; Kindb. revue bryol. 1895; Micromitrium Austin; Sull. icon. musc.

Differs from the last: Leaves longer-acuminate, more subulate, entire below middle, spreading or deflexed when moist; cells of capsule larger, not hyaline; spores smaller scarcely 0,03 m. m. nearly smooth. — *Amer.* r. »U. S.»: Sulliv.

3.**N.synoicum** James. — Ephemerum Jam.; Nanomitrium Ren. et Card.; Kindb. l. c.; Micromitrium Austin; Sull. icon. musc.

Leaves narrowly ovate lanceolate long-acuminate subulate entire, suberect when moist. Capsule neither apiculate nor regularly splitting; cells as in the last Spores about 0,02 m. m., distinctly papillose. — *Amer.* r. »U. S.»: Sulliv.

165. **Ephemeridium** Kindb. revue bryol. 1895.

1.**E.papillosum** Austin. — Ephemerum Aust.; Sullivant icon. musc.; Ephemeridium Kindb. l. c.

Leaves long narrowly ovate-lanceolate, tapering above middle to the subulate acumen, sharply serrate nearly all around, suberect when moist; cells rectangular nearly uniform; costa percurrent serrate at back. Capsule subapiculate; cells small; calyptra covering half capsule, laciniate. Spores about 0,02 m. m. nearly smooth. Confounded with *Ephemerum crassinerve.* -- On thin soil and rocks r. *Amer.* »U. S.»: Sulliv.

2.**E.hystrix** Lindberg. — Ephemerum Lindb. manip. muscor. 2 (Societ. pro flora et fauna fenn. 1874); Lesq. et Jam.; Ephemeridium Kindb. (Ephemerum spinulosum Bruch et Sch. ?).

»Leaves narrowly lanceolate-subulate, long-spinulose at margins, open-erect or subsecund, not much passing capsule; costa percurrent nearly filling the subulate point, spinulose at back. Capsule large very shortly conic-rostellate. Spores minutely tuberculate very large. — *Amer.* r. U. S.: Louisiana»: Lindb. l. c.

Fam. 36. Voitiaceæ.

166. Voitia Hornschuch.

1.**V.nivalis** Hornschuch.

Leaves distant long-acuminate not recurved; cells oblong-hexagonal or subrectangular; costa gen. long-excurrent, in uppermost leaves sometimes not excurrent. Capsule subovate-oblong; pedicel thick 2—3 c. m. long. Perichetial leaves obtusate; costa long-excurrent. Spores small. Tufts tomentose 3—8 c. m. high. — On animal dung in alp. region r. *Eur.* Austria: Breidler.

2.**V.hyperborea** Greville et Arnott.

Differs from the last: Leaves broad-ovate obtusate gen. apiculate; costa percurrent or short-excurrent. Shoot-leaves small obovate; costa vanishing far below the short point. Capsule subglobose smaller, sometimes shorter rostrate; pedicel thin less long. Stems us. not tufted. Perichetial leaves not seen. — Arctic distr. r. *Eur.* Spetsbergen: R. Gyllencreutz.

Fam. 37. Physcomitrellaceæ.

167. Physcomitrella Bruch et Schimper.

1.**Ph.patens** Hedwig. — Phascum H.; Physcomitrella B. S.

Leaves sublingulate or sublinear acute or short-acuminate; costa subpercurrent. Capsule apiculate; pedicel more or less distinct. Stem us. simple. -— Wet clayey soil. *Eur.* not r. Sweden! Finl.: Bomansson. France: Brébisson. *Amer.* »U. S.»: Lesq. et Jam.

168. Aphanorhegma Sullivant.

1.**A.serratum** Hooker et Wilson. — Schistidium H. W.; Aphanorhegma Sull. icon. m.

Leaves linear-lanceolate gen. with long subulate acumen; costa often percurrent. Capsule globose obtusely apiculate; pedicel short or indistinct. Stem often finally branching. — Wet clayey soil r. *Amer.* U. S.: Sullivant, com. C. Mueller.

2. **A. Hampei** Limpricht (»Physcomitrella patens + Physcomitrium sphæricum»). — Physcomitrella Limpr.; Aphanorhegma Kindb.

Calyptra as in the last. Capsule oval with short conic point, pedicel not much shorter. Leaves as in *Physcomitrella*. — *Eur.* r. »Germany»: Limpricht.

Fam. 38. Phascaceæ.

169. Phascum L.

A. Leaves close to an head-like bud, us. smooth and serrulate.

I. **Acaulon.** Capsule immersed globose not or indistinctly mamillate; calyptra very short mitriform. Leaves us. serrulate at the mostly recurved borders; costa r. long-excurrent. Monoecious with distinct male flowers. Plants minute.

B. Leaves not densely close, us. papillose and entire (or faintly sinuolate).

a. Capsule not rostrate.

II. **Aschisma.** Capsule immersed subglobose apiculate; calyptra broad short submitriform, often cleft at one side. Leaves papillose involute; costa subpercurrent. Monoecious with distinct male flowers. Plants minute.

III. **Eu-Phascum.** Capsule often exserted, oval-globose apiculate or r. mamillate; calyptra us. broad subcucullate or r. mitriform. Leaves us. papillose often reflexed; costa excurrent. Paroecious. Stem often distinct.

b. Capsule obliquely rostrate.

IV. **Mildeella.** Capsule sometimes exserted, suboval or r. globose; calyptra narrow cucullate. Leaves mostly papillose; costa gen. long-excurrent. Monoecious with distinct male flowers, or dioecious. Stem distinct.

I. Acaulon C. Mueller.

A. Leaves smooth; costa complete.

a. Leaves concave; costa subpercurrent.

1. **Ph. muticum** Schreber. — Acaulon C. M.; Sphærangium Schimper.

Upper leaves subovate acute or short-acuminate; borders recurved (sinuolate or serrulate) above; costa short-excurrent or percurrent. Inner perichetial leaves of same length, not wholly convolute, us. serrulate and much longer than the short-pedicellate capsule. — *Eur.* Sweden: Berggren. Engl.: Rogers. France: Brébisson. Austria: Schmidt. *Amer.* »U. S., Calif.»: Lesq. et J.

* **Ph.minus** (Hooker et Taylor, as variety) Jæger. — Ph. muticum var. minus H. T.; Acaulon Jæger; Phascum Kindb.

Smaller in all parts. Perichetial leaves entire scarcely reaching above capsule. — *Eur.* r. »France and Engl.»: Limpricht.

* **Ph.rufescens** Jæger. — Acaulon Jæg.; Phascum Kindb.; Sphærangium Lesq. et Jam.

»Leaves mostly not revolute. Pedicel of capsule sometimes curved. — *Amer.* U. S. very common in eastern and central states»: Lesq. et Jam.

2.**Ph.mediterraneum** Limpricht. — Acaulon Limpr.; Braithwaite; Phascum Kindb.; Acaulon Holtii Lindb. in litt.

Leaves smaller and narrower than in *Ph. muticum*, entire, gen. not recurved; cells smaller. Perichetial leaves unequal in length; the upper one much longer, wholly convolute and nearly entire. Capsule mamillate; pedicel indistinct. — *Eur.* r. England: G. A. Holt.

b. Leaves carinate; costa excurrent.

3.**Ph.triquetrum** Spruce. — Acaulon C. M.; Sphærangium Schimper.

Leaves suboval subacute; borders recurved and sinuolate often nearly all around; costa excurrent to a short deflexed point. Inner perichetial leaves us. 3 of same length. Pedicel of capsule curved. Plant resembling a triquetrous bud. — *Eur.* Austria: Breidler; Schmidt. France: Goulard, com. Husnot. *Amer.* Can.: Drummond, com. Macoun.

* **Ph.piligerum** Notaris. — Acaulon Limpr.

Leaves with long-excurrent costa. — *Eur.* »Italy»: Notaris.

B. Leaves papillose on both sides; costa not evolute in lower part, long-excurrent.

4.**Ph.Schimperi** Sullivant. — Acaulon Sull. icon. musc.; Sphærangium Lesq. et Jam.

Upper leaves concave, serrulate and recurved above, subovate with narrow subulate patent or deflexed point. Perichetial leaves subobovate not convolute. Capsule mamillate; pedicel curved. — *Amer.* »U. S. r.»: Sull.

II. Aschisma Lindberg.

5.**Ph.carniolicum** Weber et Mohr.

Upper leaves concave oblong-lanceolate subobtuse, not close when moist; upper cells green round-quadrate, lower hyaline short-rectangular. Capsule subglobose; pedicel very short. Plants minute cespitulose. — On sand and earth r. *Eur.* »Mediterr. distr.»:Husnot. *Amer.* »U. S.»: Lesq. et Jam.

III. Eu-Phascum.

A. Capsule with distinct lid; calyptra very papillose.

6.**Ph.rectum** Withering. — Pottia Mitten; Braithwaite.

Leaves entire papillose suboblong or subobovate. Capsule oval-globose exserted; pedicel straight; calyptra cucullate. Stem simple. *Eur.* r. Engl.: Wood. France: Le Jolis. Greece: Orphanides. Italy: Arcangeli.

B. Lid not distinct. Calyptra smooth or faintly rough.

a. Stem and pedicel indistinct. Plant subgemmiform.

7.**Ph.Floerkei** Weber et Mohr. — Microbryum Schimper.

Upper leaves papillose us. oval-ovate acuminate gen. entire, erect or patulous; their point reflexed when dry. Capsule subglobose immersed; calyptra short us. mitriform. — *Eur.* r. France: Brébisson. *Amer.* »U. S.»: Lesq. et Jam.

b. Stem distinct often divided. Pedicel distinct.

8.**Ph.acaulon** L. 1753. — Ph. cuspidatum Schreber 1770.

Upper leaves entire erect oblong-lanceolate often nearly smooth. Capsule oval-globose not or scarcely exserted above perichetial leaves; pedicel sometimes curved. Calyptra gen. broad subcucullate, r. short mitriform. — *Eur.* common in plains on fields. Sweden! *Amer.* U. S.: Sullivant, com. C. M.

* **P.piliferum** Schreber.

Leaves narrower, piliferous by costa; upper cells smaller more rotundate. — *Eur.* Sweden! *Amer.* Can.: Drummond.

9.**Ph.curvicollum** Ehrhart.

Differs from *Ph. acaulon:* Upper leaves longer acuminate slightly sinuolate near apex. Capsule wholly exserted; pedicel curved longer; calyptra narrow cucullate. — *Eur.* r. Sweden: J. Persson. France: Brébisson.

IV. Mildeella Limpricht.

10.**Ph.bryoides** Dickson. — Pottia Mitten.

Upper leaves ovate-lanceolate or r. acuminate, entire; costa us. long-excurrent. Capsule suboval; lid distinct with subulate beak; pedicel red. Stem 2—10 m. m. high. — »Peristome rudimentary»: Limpricht. — *Eur.* not r. Germany: Ahnfeldt; Roell. Austria: Schmidt. *Amer.* »U. S.»: Lesq. et Jam.

11.**Ph.subexsertum** Hooker; C. M. syn.

Differs from the last: Upper leaves crenulate-papillose above, sparingly chlorophyllose. Capsule globose; lid not distinct; beak thick; pedicel reddish yellow. Stem 5—8 m. m. high. — *Amer.* r. Can.: Drummond, com. Macoun.

Glossary.

Alar (cells) special group at basal angles.
Alate (stem) bordered by leaf-substance.
Angular (cells) those of basal angles.
Apiculate with short point.
Apophysis basal enlargement of capsule.
Appendiculate with small spurs.
Areolation tissue of cells.
Arista awn.
Attenuate tapering.
Auricled with ear-like angles.
Barren sterile.
Beak tip of lid (of capsule).
Bifarious placed on two sides.
Bifid cleft to middle.
Cancellate latticed.
Cernuous drooping.
Cespitose forming matted tufts.
Cilia hair-like appendages of inner peristome.
Circinnate rolled into a circle.
Comal (leaves) the uppermost.
Cochleariform concave as a spoon.
Complanate flattened.
Complicate folded together.
Connate united.
Costa rib of a leaf.
Cribrose sieve-like.
Crisped strongly curled.
Cucullate (calyptra) cleft at one side; (leaf) involute at apex.
Cultriform like a blade of a knife.
Cuspidate tapering to an acute point.
Decurrent (leaf) prolonged downward upon the stem.
Deflexed bent downward.
Defluent running downward.
Deoperculate without lid.
Dimorphous of two forms.
Distichous in two opposite rows.
Emarginate notched at summit.
Entire without incisions.
Eradiculose rootless (without rhizoids).
Exannulate without annulus.
Excurrent ending beyond apex.
Fasciculate collected in small bundles.
Fenestrate with dilated apertures.
Filiform thread-like.
Fimbriate fringed.
Flagellæ like a thong of a whip.
Flexuous bending inward and outward.
Fusiform spindle-shaped.
Gemmiform bud-like.
Glabrous hairless.
Habit general aspect.
Heteromorphous of different forms.
Homomorphous of like form.
Hyaline clear as glass.
Imbricate disposed like tiles.
Immarginate without special border.
Immersed not emergent.
Julaceous like a roller (by appressed leaves).
Lamellæ small thin narrow plates.
Lamina part of leaf (above a sheath).
Lateral placed at the side.
Limbate with a list (border).
Lingulate tongue-shaped.
Mamilla small nipple on lid or at apex of a leaf-cell.
Muticous without hairpoint.
Nodose nobbed.
Oblong 3 times as long as broad.
Obsolete indistinct.
Obtusate not acuminate.
Oval twice as long as broad and broader near middle.
Ovate egg-shaped.
Papilla small rounded prominence.
Paraphyllia leaf-like appendages.
Pedicel stalk of capsule.
Percurrent reaching to apex.
Pinnate branching on two sides.
Plicate folded lengthwise.
Pulvinate cushioned.
Piriform pear-shaped.
Ramose branching.
Recurved, revolute, reflexed bent back on the border.
Rimose with narrow apertures.
Rostellate (lid) with short beak.
Rostrate with long beak.
Rugose wrinkled.
Secund turned to one side.
Serrate with teeth as a saw.
Serrulate with smaller teeth.

Setaceous bristle-like.
Sinuolate not wholly entire.
Sinuous crenulate at walls.
Squamiform like a scale.
Strangulate strongly constricted below mouth.
Striate with fine furrows.
Strumose with a swelling below.
Sub-; nearly (**subovate** nearly ovate).
Subulate awl-shaped.
Sulcate grooved.
Terminal placed at top.
Tomentose with soft matted hairs.
Truncate transversely cut above.
Tumid, turgid swollen.
Umbraculiform as an umbrella.
Wing: border of leaf-base, prolonged on stem; (in *Polytrichaceæ*) prominent part of lamina; (in *Fissidentaceæ*) stipular appendage.

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Corrections and additions.

Page 49, l. 27: segments us. split; p. 92, l. 41—42: pedicel rough; p. 94, l. 14: *Amer*. N. Foundl.: Waghorne; p. 119, l. 34: alar cells large; p. 138, l. 24: Capsule small oblong pale, finally whitish; teeth very pale; segments hyaline; p. 161, l. 14: cell of lamellæ; p. 164, l. 23: Leaves entire; p. 180, l. 40: Leaves of sterile shoots; p. 335, l. 23: N. Foundl.: Waghorne.

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